Parks Canada Parcs Canada

Canada

A natural priority

A report on Parks Canada's Conservation and Restoration Program

Cover photos

Top left: The WSÁNEĆ and Hul'q'umi'num Nations of the Coast Salish people are restoring the eco-cultural clam gardens of Gulf Islands National Park Reserve. Photo: Robert Reid

Top centre: A drip torch is used to ignite dry fuels at the Sawback prescribed fire in Banff National Park. Photo: C. Siddall

Top right: A recently emerged hatchling snapping turtle begins to make its way to the water in Bruce Peninsula National Park. Photo: Tricia Stinnissen

Bottom: Three of 10 plains bison calves born to reintroduced mothers in Banff National Park. Photo: K. Heuer

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For copies of this document, or for additional information on the Conservation and Restoration program, visit parkscanada.gc.ca

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message from the minister

Our Government is committed to expanding Canada's system of protected areas and protecting its biodiversity, by conserving at least 17 per cent of our land and freshwater through a network of parks, protected and conserved areas, and other conservation measures by 2020, an objective known as Pathway to Target 1. We are also working to conserve at least 10 per cent of marine and coastal areas by 2020.

In 2017, I initiated *Let's Talk Parks, Canada!* – the largest public consultation ever undertaken by a Minister responsible for Parks Canada. This was an opportunity to engage with Canadians on Canada's system of protected natural and cultural places. Recently, I put forward several priorities: to **protect and restore** our national parks and historic sites; to enable people to further **discover and connect** with our national parks and heritage; and to sustain for generations to come the incredible value – both ecological and economic – that our national parks and historic sites provide for communities.

Parks Canada's places represent the very best that Canada has to offer and tell the stories of who we are. They also protect biodiversity, preserve our clean air and water, and play an important role in mitigating the impacts of climate change. However, the ecological integrity of national parks and marine conservation areas can be threatened by a wide variety of stresses, such as threats from invasive species and problems caused by public infrastructure. If we want to conserve these special places, now and for future generations, we must restore critical ecosystems and contribute to the recovery of species-at-risk.

The Conservation and Restoration (CoRe) projects highlighted in A *natural priority – A report on Parks Canada's Conservation and Restoration Program* demonstrate how Parks Canada is working to protect ecological integrity as a first priority. The CoRe Program also illustrates the Government's commitment to science and Indigenous knowledge as the foundation for conservation action. Many CoRe projects also contribute to reconciliation and renewed relationships with Indigenous peoples. Parks Canada places provide a backdrop to Indigenous history, cultures and traditions, and remind us that we have a collective responsibility to protect the natural world.

CoRe projects are benefitting ecosystems across our country, from restoring the boreal forest in Terra Nova National Park to reconnecting the lakes and rivers of La Mauricie National Park and helping species-at-risk recover in Gulf Islands National Park Reserve. But CoRe projects do more than restore ecosystems – they also engage and benefit Canadians. Events like the *Ahtahkakoop Cree Nation Camp* in Prince Albert National Park help Indigenous elders and youth reconnect with their traditional lands and waters. Visitors experience nature first-hand and make lasting memories through programs such as Swim with Salmon in Fundy National Park. Children learn about the environment through interactive exhibits like *Sharing Space with Wildlife* at Science World in Vancouver.

Through Budget 2018, our Government committed $1.3 billion to protect Canada's nature, parks and wildlife. This historic investment will help Parks Canada renew and enhance its efforts to protect species-at-risk, support biodiversity and conserve ecosystems.

CoRe projects are fundamental to the mandate of Parks Canada and demonstrate what can be accomplished when we are committed to protecting these national treasures. I would like to thank all of the Parks Canada team members along with Indigenous communities, partners, volunteers and all others involved in CoRe projects. The work you do is creating a true legacy for our children and grandchildren.

The Honourable Catherine McKenna
Minister of Environment and Climate Change and Minister Responsible for Parks Canada

Diverse, yet standardized

An overview of Parks Canada's Conservation and Restoration Program

Parks Canada's Conservation and Restoration (CoRe) projects are as varied as the 33 national parks, national historic sites and national marine conservation areas in which they occur. The diverse projects we report on here run the gamut from restoring forests to re-establishing eel grass; from recovering threatened whales to saving endangered plants; from reducing over-abundant moose to decreasing plentiful urchins; from mitigating invasive species threats to alleviating problems caused by roads. Different contexts, different ecosystems, different communities – and different collaborators.

Despite the ways in which CoRe projects differ from one and other, they also have much in common. CoRe projects are organized according to a set of methodological standards. They are designed to identify problems, collaborate with others, invest in solutions and realize achievements in a common manner. By following practical approaches to conservation and restoration, CoRe projects succeed in ways that engage and benefit society.

Parks Canada staff collecting whitebark pine cones that will be tested for blister rust resistance, a tactic to restore the species in Waterton Lakes and six other mountain national parks.

What's the issue?

Parks Canada identifies CoRe project problems in two ways. First, in national parks we monitor ecological integrity – that is, an ecosystem's ability to maintain itself – by measuring ecosystem change, with the degree of change reflecting good, fair or poor ecological integrity. CoRe projects typically prioritize restoration actions for ecosystems that are in poor or fair condition. Second, CoRe projects treat species-at-risk issues. These are typically identified in action plans published by the Government of Canada on the Species at Risk Public Registry. The action plans point to activities needed to protect and recover the species (e.g. increase population size, improve habitat), and so about one third of CoRe projects focus on those types of issues.

What's our approach?

To improve integration, communication and effectiveness among projects, CoRe promotes the use of consistent terminology and a standard approach to conservation planning and implementation – guidelines collectively known as the Open Standards for the Practice of Conservation. The Open Standards aim to remedy common weaknesses of conservation and restoration plans by applying a simple, transparent adaptive-management framework that improves team unity, project conceptualization, long-term efficiency and the assessment of conservation outcomes. A key expectation for CoRe projects is that they're efficient, engaging and effective – principles espoused by Parks Canada and our partners[1]. Their success is also based on evidence. CoRe projects define *a priori* what they aim to accomplish and how success will be measured. By registering accomplishments, Parks Canada objectively evaluates the relative success of CoRe projects on an annual basis.

What's been accomplished?

Summarized in this report are over 40 CoRe projects currently underway or recently finished. The diversity of conservation issues, approaches and accomplishments across the country is evident. Thirty-four percent of projects are recovering species at risk. Forty-one percent are managing invasive species. Prescribed, or controlled, fire is used in 29 percent of projects to restore species and ecosystems. Fifty-one percent involve transplanting or translocating species back into our protected heritage areas.

About half of all projects are collaborations with Indigenous communities or partners, providing invaluable contributions to their success. All projects engage stakeholders, partners, visitors or Canadians in a range of virtual or in-person experiences. Innovating, learning and adapting to sometimes relatively new conservation issues, project leaders have been able to achieve a national goal of meeting at least 60 percent of ecological targets – a success that will only continue to improve as we gain more experience in restoration.

As you read through the following project snapshots, our hope is that you learn something new about the challenges species and ecosystems face in protected heritage areas, what Parks Canada has done or is continuing to do to remedy these problems, and what we have learned or achieved along the way.

[1] Keenleyside, et al. (2012). Ecological restoration for protected areas: principles, guidelines and best practices (Vol. 18). IUCN.

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* *indicates the project has a species-at-risk focus*

Saving the seedlings

Regenerating the forests of Terra Nova National Park

Find out more

What's the issue?

Terra Nova National Park faces an ecological challenge that's common across several parks – namely, a decline in forest health caused by too many hungry moose and too little fire. The predicament is due in part to decisions of the past. First, moose were introduced to Newfoundland in the late 1800s. Since then, the population has thrived in this predator-free environment, which provides tasty hardwood and fir seedlings for their insatiable appetites. In some areas of the park, moose browsing is so intense that trees are simply not regenerating and forests have turned into open fields. Second, aggressive suppression of wildfire from the 1960s to the 1990s disrupted a natural process that's necessary for forest regeneration. Some forests have become over-mature and weaker as a result. Terra Nova is now taking action to remedy the consequences of these past decisions.

What's our approach?

- Consult, plan and execute a moose population reduction program to enable regeneration of hardwood and balsam fir seedlings.
- Plant native tree seedlings in areas where moose populations are being reduced.
- Use prescribed fire to restore a minimum of 200 hectares of over-mature black spruce forest.
- Engage local community leaders, partners and youth in forest restoration initiatives.

What's been accomplished?

- Reduced the moose population by 30 percent from 2013 to 2017, resulting in 25 percent less browsing on hardwood species, and increased densities of balsam fir seedlings (25 percent) and saplings (88 percent).
- Conducted four prescribed fires (2014–2017), covering 190 hectares of black spruce forests.
- Collaborated with Memorial University, provincial government and Miawapukek First Nation in forest restoration activities; re-invented the Activity Centre in Newman Sound; established a Forest Health Pavilion and interpretive trail at Ochre Hill to educate Canadians about boreal forest health.

TOP Aerial view of the Spruce Pond prescribed fire, part of a multi-faceted boreal forest restoration project.
BOTTOM Platform on Ochre Hill, which is part of the Forest Health Pavilion built in 2017.

Controlling a hungry herbivore

Reducing moose populations to regrow forests in Gros Morne National Park

Find out more

What's the issue?

Moose were introduced to Newfoundland a century ago. With lots of food, few predators and little disease, the numbers of this hungry herbivore increased spectacularly – especially in Gros Morne National Park, where densities of moose in the lowland forests are five to 20 times higher than in other parts of Canada. Their intense browsing has had extreme effects in Gros Morne. About 65 square kilometres of once-healthy forest have turned into treeless meadows, and 75 percent of the forests that should be regenerating no longer are; young trees are absent or are smothered out by fast-growing weedy plants. Forest biodiversity is also declining and forest-dependent species are losing habitat. Early efforts to control moose populations in the park were successful (2011–2014), but we now know that for forests to properly regenerate in western Newfoundland, their population numbers need to be reduced further still.

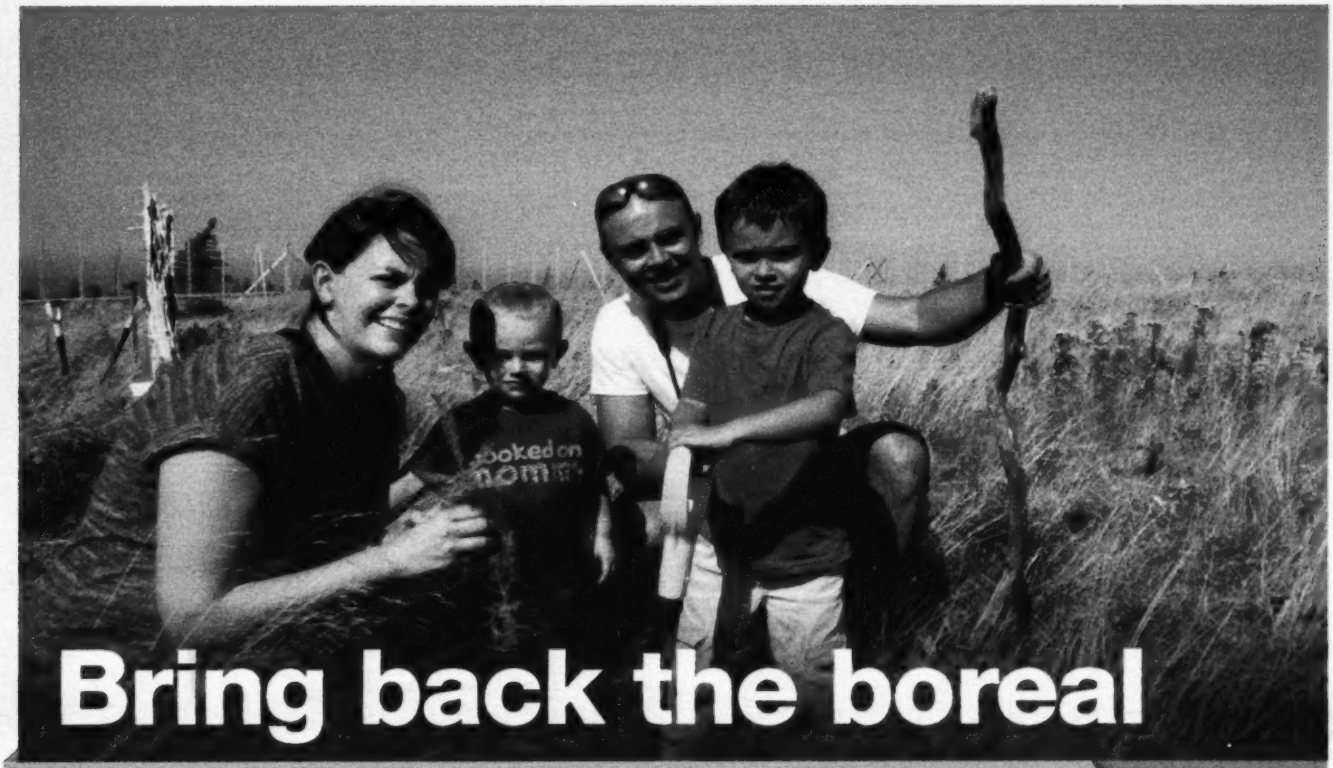
What's our approach?

- Building on the success of the first moose reduction program, harvest additional moose so the population is two moose per square kilometre of habitat.
- Monitor the regeneration of understory regrowth and browse by moose.
- Communicate often and broadly, using multiple formats and venues, to share the importance of the restoration program to Canadians and visitors.

What's been accomplished?

- In partnership with volunteer moose hunters, reduced the moose population to approximately 2,000 animals in 2017 (two moose per square kilometre).
- Reversed long-term declines observed in the forest ecosystem; improved the ecosystem status by increasing balsam fir growth, sapling and shrub numbers, and understory biodiversity.
- Supported Indigenous and not-for-profit organizations by providing access to moose meat for community freezers and fundraising efforts.
- Included forest health and forest restoration messages in communications with Canadians, visitors and area residents through interpretive activities, park trails, school programs and online presentations.

TOP Parks Canada staff conduct vegetation surveys within an area fenced off from moose to assess tree growth and the health of forests. Photo: Sheldon Stone
BOTTOM Balsam fir regeneration is beginning to reappear along the Baker's Brook Falls trail in 2017 thanks to lower moose densities, which have reduced browsing. Photo: Tom Knight



Bring back the boreal

Restoring forest health to Cape Breton Highlands National Park

Find out more

What's the issue?

By the 1920s, moose and wolves had disappeared from Cape Breton Island as a result of European hunting and settlement. In the 1940s, moose were reintroduced and the new population took hold. Thirty years later, a spruce budworm outbreak – a natural disturbance in boreal forests – killed mature trees, but was so massive in scale it made way for an unprecedented amount of succulent new growth that moose prefer. A lack of natural predators, combined with low levels of hunting meant the moose thrived and the ecosystem suffered; moose ate young trees before they could mature, leaving behind fields instead of forests. A myriad of species in Cape Breton Highland National Park have been affected, including the threatened Bicknell's thrush, which depends on forests to survive. Particularly hard hit is North Mountain, where grassland now covers two thirds of an area once forested. Biodiversity has been disrupted in an area where the Mi'kmaw people have been stewards of these lands since time immemorial.

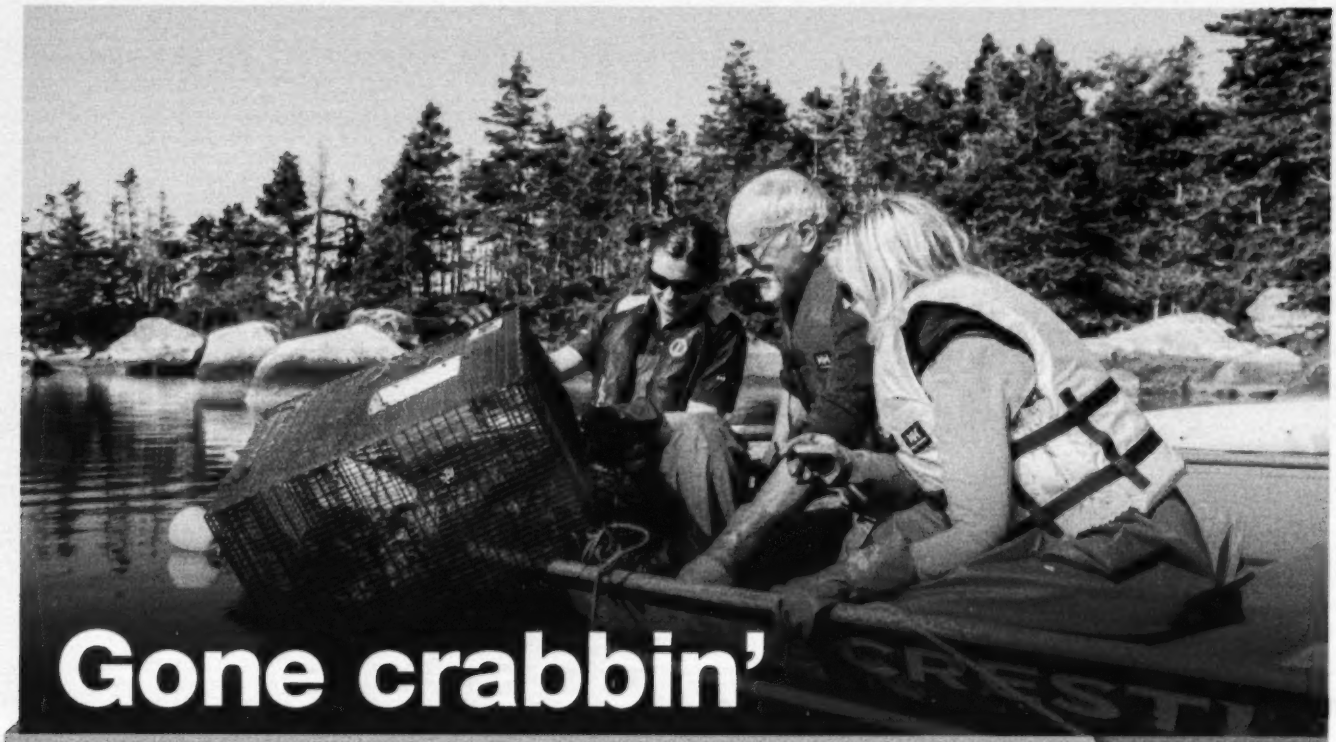
What's our approach?

- Work with Mi'kmaw partners to find sustainable solutions to restore the boreal forest.
- Encourage natural forest regeneration by reducing the moose population.
- Monitor browse on regenerating balsam fir and white birch.
- Construct moose exclosure to protect balsam fir seedlings and create Bicknell's thrush habitat.
- Increase density of white spruce and balsam fir to more than 7,000 stems per hectare to support Bicknell's thrush.

What's been accomplished?

- Maintained moose-reduction partnership with the Mi'kmaq of Nova Scotia.
- Reduced North Mountain moose population by more than 60 percent annually; decreased browse impacts on North Mountain.
- Constructed a 5-hectare exclosure on Skyline Trail (2015) featuring interpretive panels, a viewing platform and a webcam enjoyed by more than 25,000 visitors in its first year.
- Planted 57,000 white spruce and balsam fir seedlings (2015–2017); achieved 3.4 hectares with more than 7,000 stems per hectare for Bicknell's thrush.
- Recruited 2,700 volunteers, including students and Mi'kmaw youth.
- Produced videos (video 1, video 2) to share project details with the public.

TOP Volunteers plant white spruce seedling on the Skyline Trail as part of Bring Back the Boreal restoration project. Photo: Nadine Lefort
BOTTOM Contractors plant balsam fir seedlings, protected from moose behind a fence exclosure on the Skyline Trail. Photo: Tentree



Gone crabbin'

Restoring Kejimkujik National Park Seaside

Find out more

What's the issue?

In the 1980s, ships leaving Europe and North Africa inadvertently brought European green crabs to the Eastern U.S., where this invasive species began to flourish. Eventually, the crabs migrated north, thriving in the turquoise waters of Kejimkujik Seaside. There they began to severely affect the marine ecosystem – destroying eelgrass meadows while searching for food and voraciously consuming juvenile soft-shell clams. Both eelgrass and soft-shell clams are important parts of Kejimkujik Seaside estuaries; eelgrass meadows form nursery habitats for juvenile fish and invertebrates, while soft-shell clams regulate water quality and are a critical food source for migrating shorebirds. At its peak, the green crab invasion reduced eelgrass down to 2 percent of its previous extent and juvenile soft-shell clams became exceedingly rare. Faced with this alien threat, Parks Canada is determined to act before green crabs cause irreversible damage to Kejimkujik Seaside.

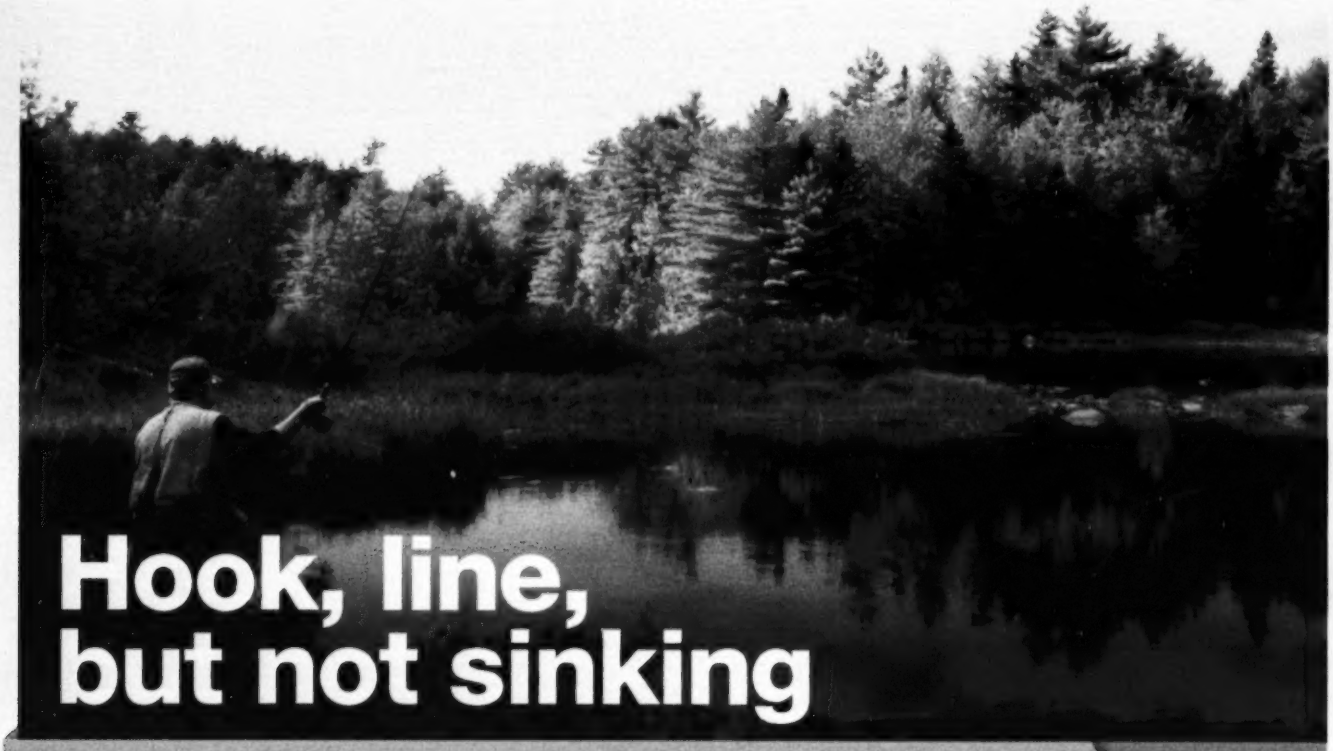
What's our approach?

- Design a pilot project in consultation with local fishers and coastal ecosystem experts to develop and test an effective European green crab trap.
- Remove as many green crabs as possible and measure effectiveness by monitoring the recovery of eelgrass and soft-shell clam populations.
- Refine and expand trapping effort and eelgrass restoration in two lagoons.
- Develop an engaging visitor experience.

What's been accomplished?

- Designed and tested an effective green crab trap in 2010, halting the loss of eelgrass within the first season.
- Building on the early trapping success, initiated the Coastal Restoration Project in 2014, removing over 2 million crabs.
- Recovered 38 percent of eelgrass beds by replanting in crab-free areas.
- Increased the number of juvenile soft-shell clams and the overall health of the population.
- Witnessed the recovery of native crab, fish and bird populations to the estuaries.
- Launched the successful Gone Crabbin' visitor experience, promoted the project with regional news media, and encouraged 2,000 hours of volunteer time for coastal restoration efforts.

TOP Visitors participating in the Gone Crabbin' program, which removes invasive European green crabs, thereby restoring native eelgrass meadows and soft-shell clam populations. BOTTOM Since removing European green crab (top) from estuaries, we've seen an increase in native species, like rock crab (bottom). Photo: Gabrielle Beaulieu



Hook, line, but not sinking

Saving the fishing legacy of Kejimkujik National Park and National Historic Site

Find out more

What's the issue?

Fishing has played an important role in the history of Kejimkujik National Park and National Historic Site – from traditional food gathering by the Mi'kmaq, to guided fishing trips before the park was established. The park's pristine waters and intact aquatic communities are considered a regional gem because many other watersheds in Nova Scotia have been negatively affected by the introduction of non-native smallmouth bass and chain pickerel. Invasions by these species have had profound impacts on ecosystems; smallmouth bass and chain pickerel are voracious food consumers that outcompete or eat native species. Both species are now found in neighbouring watersheds, where they pose a direct risk to the park's freshwater ecosystems, including native populations of brook trout and American eel.

What's our approach?

- Consult with local Indigenous communities and scientific experts on potential solutions; identify the likeliest routes of invasion and conduct surveys to detect any incursions early on.
- Use visitor programs and media to increase public awareness, and prevent inadvertent introductions and further spread of invasive fish.
- Work with provincial partners in Nova Scotia to reduce existing invasive fish populations in neighbouring watersheds.
- Collaborate with anglers to build awareness and increase invasive species monitoring network.
- Build a plan to prevent future invasions and be ready to respond rapidly if invasive species are found in the park.

What's been accomplished?

- In consultation with Indigenous communities and experts, identified high-risk watersheds in the park and conducted ongoing surveys to detect any invasions (none detected to date).
- Raised public awareness through the Learn to Fish program (114 participants in two years) and media coverage.
- Working with Nova Scotia Inland Fisheries, reduced the population of smallmouth bass in Cannon Lake next to the park to minimize the risk of invasion.
- Generated more than 1,100 hours of monitoring data per year through the Angler Diary Program (no detections of invasive species to date).
- Ongoing collaboration with Mi'kmaw First Nation, local and government experts to examine additional options for protecting large areas of the park from invasive fish, including the installation of invasive-fish barriers.

TOP A volunteer angler fishes the head of Peskowesk Brook. Photo: Darrin Reid BOTTOM Electrofishing boat ready to launch into Cannon Lake in the summer of 2017, just outside Kejimkujik National Park, to remove invasive smallmouth bass so they are less likely to enter and become established in the park. Photo: Darrin Reid

Our future forests

Restoring the Acadian forests of PEI National Park

Find out more

What's the issue?

The Acadian forest region is made up of a unique blend of northern hardwood and boreal forest trees found nowhere else on earth. Historically extending throughout the Maritimes, including what is now Prince Edward Island National Park, healthy Acadian forest typically includes trees at various stages of maturity – from seedlings to 200-year-old matriarchs. This rich combination once offered diverse habitats for wildlife that depend on old-growth forests – species such as pileated woodpeckers, which nest in tree cavities, and various mammals like flying squirrels. For the Mi'kmaw people, Acadian forests were also an essential part of their culture. The forests provided food, medicine, materials for shelter (wigwams), transportation (canoes, snowshoes) and various utensils (baskets, fishing spears). Today, as little as 1 to 5 percent of Acadian forest remains in its natural state, much having been cleared for agriculture. In PEI National Park, most forests have begun the slow process of returning to Acadian forest, but are in early stages of succession, primarily as white spruce monocultures. The loss has reduced biodiversity, diminished ecosystem function and had negative cultural impacts for Indigenous people.

What's our approach?

- Increase the area available to re-establish Acadian forest by removing unnecessary infrastructure (buildings, roads) from the park.
- In white spruce monocultures, speed up the process of change and transition to Acadian species by cutting patches and thinning the forest. Use low impact removal techniques that mimic natural disturbance such as wind storms and natural mortality.
- Where appropriate, plant a diversity of Acadian forest species sourced from local nurseries.
- Create a database of seed-bearing Acadian species in the park to help support seed-banking and planting of locally sourced seedlings.
- Collaborate with the Indigenous community to gain information about cultural perspectives for incorporation into the restoration plan.

What's been accomplished?

- Removed 19 hectares of infrastructure, including roads, parking lots and buildings, creating space for the re-establishment of Acadian forest.
- Thinned 27 hectares of white spruce monoculture to accelerate regeneration of Acadian species.
- Planted more than 54,000 seedlings of Acadian tree and shrub species across 120 hectares.
- Located and documented mature, seed-bearing trees of Acadian species to track growth and seed production.
- Gained rich cultural perspectives from Mi'kmaw elders, who shared the importance of Acadian forest species such as white birch – its bark is used by Indigenous artisans and fungus has medicinal properties – which ensured their inclusion in the restoration plan.

TOP A Parks Canada summer student plants a sugar maple seedling in an effort to restore Acadian forest. Photo: Hailey Lambe
BOTTOM Local Mi'kmaq constructed a wigwam using white birch, an Acadian tree species, harvested from PEI National Park.

A blooming return

*Restoring the Gulf of St. Lawrence aster to Kouchibouguac National Park**

Find out more

What's the issue?

The Gulf of St. Lawrence aster is found nowhere else in the world but New Brunswick, Nova Scotia, Prince Edward Island and Quebec's Magdalen Islands. The plant, which thrives in salt marsh, has declined in recent years because of habitat loss. The reasons are many: shoreline development, increased erosion, rising sea levels and disturbance from recreation. While the species once could be found in Kouchibouguac National Park, a storm in 2000 smothered the plants under sand so deep that the seeds were unable to germinate and the population winked out. This rare aster has not been seen in the park since then.

What's our approach?

- Collaborate with botanists from the University of Prince Edward Island and the Atlantic Canada Conservation Data Centre to recover this rare plant.
- Transplant at least 640 greenhouse-grown plantlets at four sites over a two-year period in Kouchibouguac National Park.
- Develop and implement a monitoring plan to assess recovery of the species.
- Engage Canadians using new and traditional media, and provide visitors with meaningful opportunities around the recovery story of this species.

What's been accomplished?

- In collaboration with expert partners, successfully germinated plants in a greenhouse.
- Surveyed habitat appropriate for seed or transplant plots and inventoried several hundred potential sites; transplanted 800 plants at 14 sites and scattered 30,000 seeds in 31 additional sites (2016 and 2017).
- Recorded survival of transplanted individuals at 95 percent in 2016 and 60 percent in 2017, and observed 1,330 mature plants in 2017 at the seeded plots – the first time in more than 12 years that this plant regenerated naturally in the park!
- Delivered interpretation programs at the park and interviews to national media to teach visitors and Canadians about the recovery of the Gulf of St. Lawrence aster.

TOP Pallets of threatened Gulf of St. Lawrence aster are transported for planting at Le Barachois salt marsh restoration site. Photo: Philippe St-Onge
BOTTOM An adult Gulf of St. Lawrence Aster about to flower. Photo: David Mazerolle/© ACCDC

** indicates the project has a species-at-risk focus*

Action underwater

*Bringing wild salmon back to Fundy National Park**

Find out more

What's the issue?

Inner Bay of Fundy Atlantic salmon are critically endangered across their range, including in Fundy National Park. Their troubles began with historic overfishing at sea and were then compounded when freshwater habitats were degraded. At their peak in the mid-1960s, 40,000 adults returned to spawn within the 40 or so rivers of the inner bay; by 2003, less than 200 made the return trip. Because they are an important source of food and culture for Indigenous peoples, there's an added urgency to save this iconic species. Through collaboration with Indigenous partners, industry and local communities, Fundy National Park is determined to apply innovative methods to help restore the Inner Bay of Fundy Atlantic salmon.

What's our approach?

- Work in partnership with Fort Folly First Nation and industrial partners to rear large numbers of adult salmon in sea cages for wild release.
- Study the fitness of released salmon that have spent limited time in captivity.
- Release high numbers of adult native salmon to spawn naturally so their offspring are produced and mature entirely in the wild.
- Monitor the production of wild-hatched offspring and the number of returning salmon to evaluate the overall effectiveness of our approach for population restoration.
- With academic partners, conduct research to better understand how restoration is affecting multiple levels of the food chain – from nutrients to top predators.

What's been accomplished?

- Partnered with aquaculture industry and established the first wild Atlantic salmon conservation farm, using live gene bank specimens to safeguard this unique population.
- In 2016, released 844 native adult salmon into the Upper Salmon River.
- In 2017, detected juvenile, wild-born salmon throughout the Upper Salmon River, making it the only river in the population range fully occupied with wild-hatched juvenile salmon!
- Garnered major media coverage, including a TV Ontario documentary (800,000 viewers), a Toronto Star travel feature, and a Canadian Geographic article; published multiple scientific articles documenting efforts and evidence of success.
- Began popular Swim with the Salmon program, which invites visitors to engage in recovery monitoring of the iconic species.

TOP Park visitors help monitor Inner Bay of Fundy salmon restoration during the Swim with Salmon program. Photo: Nigel Fearon Photography
BOTTOM Hatchery-reared wild salmon being released into the Upper Salmon River in October 2017. Photo: Nigel Fearon Photography

** indicates the project has a species-at-risk focus*

Trail to 2019

Restoring the trail network in Fundy National Park

Find out more

What's the issue?

When Fundy National Park was established in 1948, many existing cart paths and logging roads were simply repurposed as recreational trails for visitors. While this approach saved time and money early on, these trails have become unsuitable for modern-day use – being wider than necessary, susceptible to erosion, costly to maintain, and unattractive or unsafe for hiking and biking. Park staff also began to notice adverse ecological effects, including invasion by alien plants (Japanese knotweed), that impact native biodiversity, and poorly designed stream crossings that reduce water quality and degrade riverbank habitat. In response, Fundy took on the challenge of redesigning an entire network of sustainable trails – a system to serve the recreational needs of visitors, encourage engagement in wise land-use management and restore ecological values – all before 2019.

What's our approach?

- Consult with industry experts, partners and staff to design and construct a sustainable hiking and biking trail system.
- Reduce the overall trail footprint by 5,000 square meters by narrowing sections, removing unnecessary infrastructure such as boardwalks and pavement, and remediating areas by scarifying, mulching and planting native vegetation.
- Restore 25 km of unsustainable trails by redesigning and rebuilding trails to follow natural contours and slopes.
- Reduce the amount of habitat vulnerable to invasive plants such as Japanese knotweed to prevent further spread.
- Coordinate with infrastructure projects for trail restoration and achieve win-win gains.

What's been accomplished?

- Collaborated with the International Mountain Biking Association on a sustainable trails workshop for park staff, regional stakeholders and volunteers.
- Decommissioned 56 percent of unsustainable trails (2,187 square meters) and planted more than 600 native trees in restored areas, including 65 red spruce saplings propagated from old-growth seed collected in Fundy.
- Began realignment and restoration of 16.4 km of trail to follow natural landscape contours; reduced the potential for erosion and improved the overall visitor experience.
- Prevented further spread of target invasive species like Japanese knotweed.
- Aligned restoration with infrastructure renewal projects to maximize the scope and benefits; a total of 52 km of trails will be restored or decommissioned by 2019.

TOP Students from the Maritime College of Forest Technology working with Parks Canada staff decommission and restore a closed portion of the Caribou Plain Trail. Photo: Craig Norris
BOTTOM Extensive erosion damage along Goose River Trail that was decommissioned, restored and replaced with a much narrower path. Photo: Jane Watts

Sparking an interest in fire

Restoring the role of fire in eastern Canadian national parks

Find out more

What's the issue?

Society generally views fire as a destructive force, stamping it out wherever it's found – historically so, even in Canada's national parks. Today, Parks Canada has a deeper understanding of the important role fire plays in the health of forest ecosystems. Without fire, many species, such as white pine, red oak and pitch pine, struggle to regenerate. Forests that never burn become less diverse in structure, age and species, and have low reproductive vigor, making them especially susceptible to disease, pest infestation and catastrophic loss. Armed with this knowledge and specially trained staff, Parks Canada has developed a wealth of experience in the use of controlled, or prescribed fire to maintain and restore forest ecosystems. These carefully planned operations also often provide exciting opportunities for park visitors to learn about the practice and benefits of prescribed fire across Canada's eastern national parks.

What's our approach?

- Restore the role of fire as an agent of regeneration by carefully planning and applying prescribed fire.
- Increase the capacity and expertise of park staff in fire operations.
- Use expertise from national fire teams based at La Mauricie National Park (Quebec) to lead the application of prescribed fire in five of eastern Canada's national parks.
- Target sites where species such as white pine, red oak and pitch pine will naturally regenerate following fire.
- Develop communication and engagement plans to raise awareness about the role of fire.

What's been accomplished?

- Used prescribed fire in 72 percent of target areas across Cape Breton Highlands (1 hectare), Forillon (11 hectares), Kejimkujik (4 hectares), La Mauricie (1,640 hectares) and Thousand Islands (6 hectares) national parks.
- Created new knowledge and experience in fire management across eastern national parks.
- Created an animated digital game to teach Canadians about how Parks Canada uses prescribed fire.
- Conducted engaging media outreach on fire management, such as on CBC radio.

TOP Aerial ignition of a prescribed fire at Grande-Cavée, Forillon National Park. Photo: Stéphane Marchand
BOTTOM A drip torch is used to ignite dry fuels at the Lac en Coeur prescribed fire in La Mauricie National Park. Photo: Elisabeth Caron

Preserving an emblem

Thistle conservation in Mingan Archipelago National Park Reserve

Find out more

What's the issue?

The Mingan thistle is under threat in the very park that shares its name. Found in small colonies on four islands in Mingan Archipelago National Park Reserve, the unique Mingan thistle is increasingly subjected to destructive storm surges, encroaching forests, low snow cover and summer drought. In decline since 2011 and numbering fewer than 445 plants, only one of nine known colonies is considered to be viable over the long term. Without help from Mingan Archipelago staff, this species could drastically decrease across eastern North America.

What's our approach?

- Restore Mingan thistle habitat by removing tree debris and by removing tree debris, rocks and sand brought in by storms.
- Identify new, suitable habitats to establish new colonies.
- Collect and sow seeds in areas that will increase the chance of propagation; ensure the genetic diversity of the population is represented and maintained in seed collections.
- Use seed collection and offsite propagation to increase the number of plants and seeds available for use in restoration initiatives and research.
- Continue engaging Canadians, visitors and stakeholders to inform them of the challenges and opportunities for restoring the Mingan thistle.

What's been accomplished?

- Uncovered and saved Mingan thistle individuals buried by a December 2016 storm; removed trees that threatened the survival of plants and installed rocks to stabilize sand in some colonies.
- Inventoried all colonies and conducted viability analyses.
- Harvested and sowed seeds from all seven flowering individuals in the park (2017).
- Collaborated with the Montreal Biodome and the Gosling Research Institute for Plant Preservation (University of Guelph) to produce more seeds and seedlings for recovery.

TOP Nets used to capture Mingan thistle seeds as part of the efforts to recover this rare species. Photo: Valérie Delisle Gagnon
BOTTOM Parks Canada staff measures the height of a mature blooming Mingan thistle. Photo: Patricia Moreau

Adapting to climate change

Restoring coastal dynamics in Forillon National Park

Find out more

What's the issue?

Climate change is causing sea levels to rise in the Gulf of Saint Lawrence. By 2050, part of the shoreline on the Penouille Peninsula in Forillon National Park is predicted to be periodically under water. With beaches submerged, species and ecosystems will respond; new beaches will form, and beach grasses will shift locations. More intense storms and less protective ice in winter – two other consequences of climate change – are already having negative effects on park roads, trails and buildings built close to the coast. With trails deteriorating, visitors will have no choice but to walk through sensitive areas, trampling plants such as the rare sand heather. Staff at Forillon are restoring the coast to help the park adapt to change.

What's our approach?

- Reduce infrastructure by decommissioning the deteriorated access road to Penouille Peninsula; re-establish native beach grasses in its place.
- Relocate or redesign buildings and trails so they are more resilient to changing water levels and storm surge.
- Engage stakeholders, visitors and Canadians about coastal erosion, adaptive management initiatives and how they can help protect this sensitive area.

What's been accomplished?

- Removed the access road to Penouille Peninsula; planted 450 square meters of native plants to help stabilize the sand.
- Removed one building, and redesigned and constructed another on stilts so it can withstand fluctuating water levels, be submersed for a short time or easily moved.
- Created new trails to achieve a 76 percent reduction of trampling of sensitive plant species in target coastal areas.
- Communicated broadly with the public online, through videos and social media, and via traditional media; garnered widespread support and understanding of restoration initiatives.

TOP A damaged access road along the Penouille Peninsula before it was removed as part of an effort to restore coastal ecosystems.
BOTTOM Parks Canada staff plant native beach grass on the Penouille Peninsula, restoring a coastal area where an access road was decommissioned.

Creating resilient shorelines

Coastal restoration in Forillon National Park

Find out more

What's the issue?

The shorelines are eroding at Cap-des-Rosiers in the Gaspé Peninsula's Forillon National Park. This unprecedented process has been aggravated by rising sea levels in the Gulf of Saint Lawrence, increased storm intensity, and a decrease in the amount protective ice in winter. As a consequence, park roads, trails and other infrastructures that are not suited to a coastal environment have begun to deteriorate, raising maintenance costs and safety concerns. Further, these environmental changes have reduced the integrity of the area's natural and cultural features – beach habitat for spawning capelin has reduced considerably and an historic monument is at risk of being washed out to sea. In response, Forillon National Park staff set out to restore the dynamic coastal environment using ecologically sensitive and sustainable solutions.

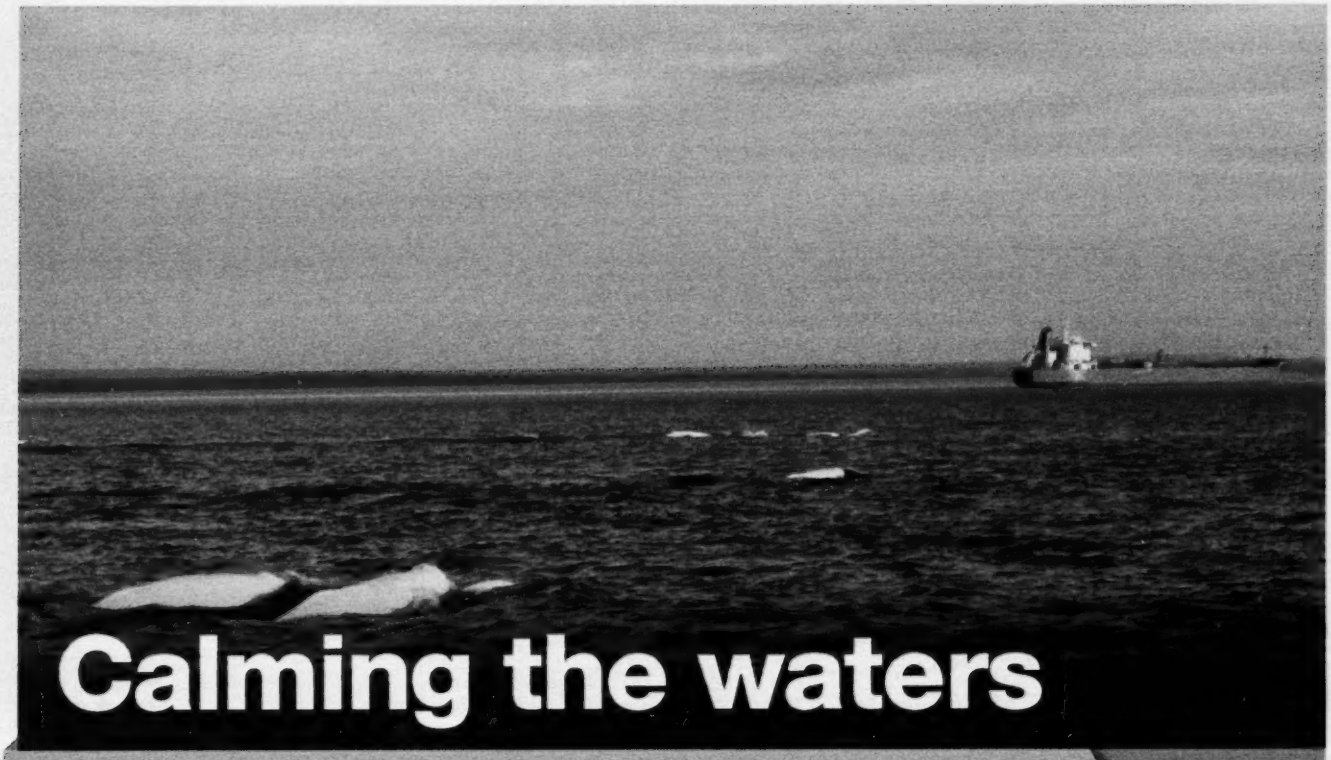
What's our approach?

- Collaborate with local universities and expert consultants to research strategies for adapting and restoring the coastal ecosystem of Cap-des-Rosiers.
- Re-establish native beach grasses to restore the back beach area and improve the natural resilience of the beach profile.
- Improve the quality and quantity of capelin spawning habitat on the beach.
- Safeguard the Carricks monument (commemorating the 1847 sinking of an Irish immigrant ship).
- Decommission all vulnerable infrastructure and redesign a multi-use trail for visitors between the park entrance and the Cap-des-Rosiers harbour.
- Develop and install interpretation panels for visitors to learn about the coastal restoration.

What's been accomplished?

- Worked with the Université du Québec à Rimouski to better understand coastal erosion and develop methods for adapting to the changing Gulf of Saint Lawrence coastal dynamics.
- Dismantled 1.5 km of coastal road, public utilities and shoreline riprap; contoured beaches, creating a gradual slope and making them more resilient to winter storm surges and winds.
- Naturalized the beach front and increased capelin spawning habitat by 1.1 hectares.
- Relocated the Carricks monument to a protected inland location.
- Started construction of a multi-use trail, elevated to accommodate water fluctuations (to be completed by 2019).
- Designed interpretive panels for visitors to raise awareness about coastal dynamics and restoration (to be completed by 2019).

TOP A bulldozer restoring natural grade to the Cap-des-Rosiers beach after removal of a dilapidated coastal road.
BOTTOM Parks Canada staff sample capelin eggs at Cap-de-Rosiers beach.



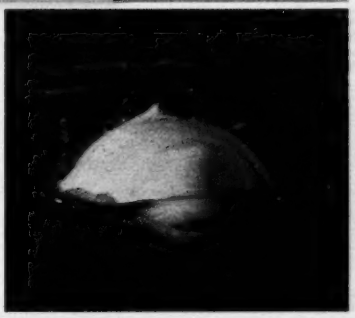
Calming the waters

*Reducing disturbance for whales in the Saguenay–St. Lawrence Marine Park**

Find out more

What's the issue?

Saguenay–St. Lawrence Marine Park, established in 1998, was created in part to help protect marine wildlife – especially threatened whales, including the world's most southerly population of beluga whales. Among other features, the park provides essential habitat – sheltered bays and rich estuaries – for migratory whales to feed and for beluga to give birth and care for their newborn calves. But industry, recreation and other human activity in this open marine environment can cause problems for beluga and other whales, which are sensitive to disruption in their environment, especially during vital activities like feeding and resting. Parks Canada is taking a cooperative approach to ensure sustainable use of the marine environment by working with partners towards calming the waters – a challenge that needs to be solved if this critical habitat and unique population of beluga are to recover.



What's our approach?

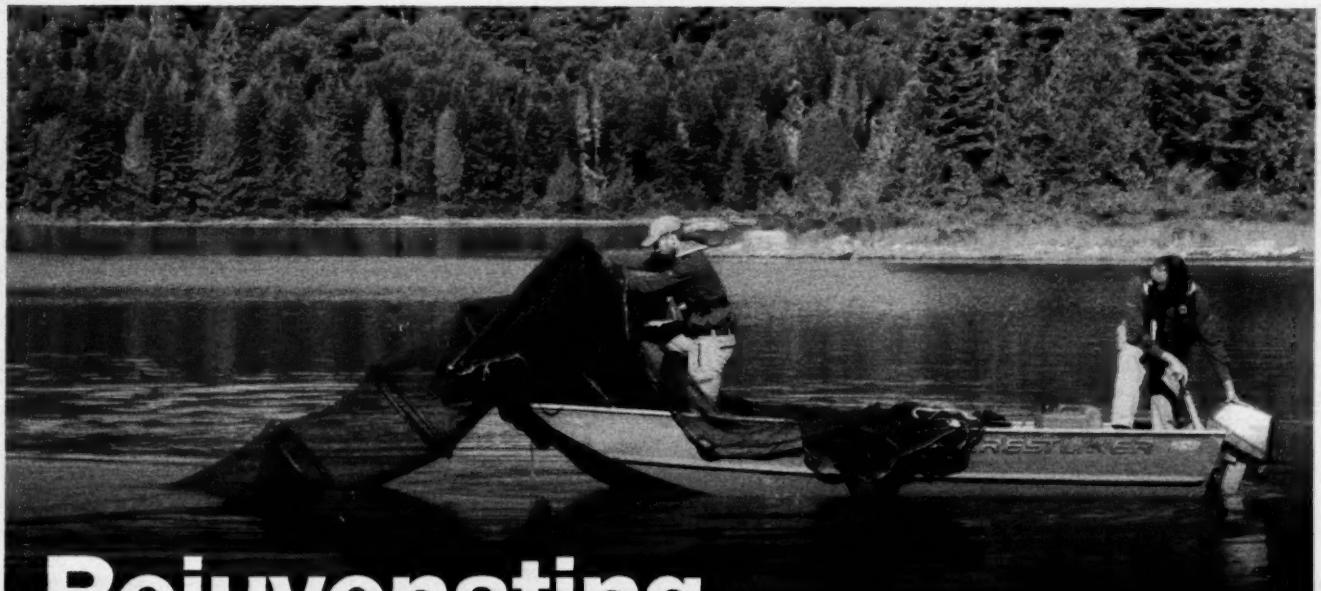
- Use an evidence-based approach to define where and when whales use specific areas of the Saguenay–St. Lawrence Marine Park for vital functions such as calving and feeding; recommend approaches to reduce risk to the whales.
- Use the best available scientific and local knowledge to work with regional, provincial and federal government organizations, and maritime stakeholders such as the tourism and shipping industries, on conservation measures.
- Work with partners to implement these conservation approaches and monitor their effectiveness; communicate broadly with marine park users and Canadians to encourage understanding of and support for marine conservation.

What's been accomplished?

- Collected data on maritime traffic and published a scientific paper; completed a scientific review of the effectiveness of recovery measures.
- Monitored and assessed voluntary protection measures – such as using lower speeds and avoiding certain areas – that reduce the risk of ships striking whales and that minimize the effect of noise in the marine park and surrounding waters.
- Completed plans for a 2019 scientific review of the effectiveness of our protection measures to keep knowledge up to date and to adapt our management approach as necessary.
- Continued to collaborate with partners from all sectors towards a sustainable strategy for protecting whale habitat; released an online brochure on the importance of the marine park.

TOP A pod of beluga whales surface while swimming close to large a commercial ship. Photo: Manuela Conversano
BOTTOM A beluga whale surfaces while swimming in the Saguenay–St. Lawrence Marine Park. Photo: Manuela Conversano

** indicates the project has a species-at-risk focus*



Rejuvenating aquatic ecosystems

Restoring the lakes of La Mauricie National Park

Find out more

What's the issue?

From the mid-1800s to about 1970, woodlands in and around what is now La Mauricie National Park were heavily logged – an activity that affected more than just the forests. The lakes and rivers used to transport timber were also profoundly changed, and traces of this era are still visible in the form of old dams, high water levels, sunken logs and a general decline in the health of aquatic ecosystems. Native brook trout were a casualty of these changes – its habitats degraded, its populations contracted, its genetic integrity diluted. Past actions also led to invasions by 20 non-native fish species, further endangering freshwater communities. Since 2004, staff at La Mauricie have been working to improve natural conditions of the park's lakes and streams and actively restoring the iconic brook trout populations.

What's our approach?

- Maintain genetic diversity of brook trout populations by capturing and breeding individuals in fish hatcheries, and releasing offspring to their native lakes.
- Eliminate invasive fish from lakes into which trout are to be reintroduced.
- Clear abundant log debris from shores and lake bottoms to improve habitat quality.
- Restore fish passage routes between water bodies by dismantling old dams.
- Engage Canadians and raise awareness among visitors about opportunities and methods to restore impaired aquatic ecosystems in La Mauricie.

What's been accomplished?

- Captured and preserved genetically distinct populations of brook trout from five lakes and collaborated with fish hatcheries to rear and release 49,500 brook trout into nine lakes.
- Removed non-native fish from 12 lakes and cleared almost 98,000 logs from 18 lakes.
- Dismantled 18 old log dams to restore natural water levels and passage for fish.
- Connected with Canadians through social and national media, regional and local publications, as well as at two major events in Montreal.

TOP Parks Canada staff use an Alaskan trap net to capture and preserve native brook trout.
BOTTOM One of many old logs is removed from the bottom of a lake to restore brook trout habitat.

Swimming the ladder to survival

*Improving the fishway at Saint-Ours Canal National Historic Site**

Find out more

What's the issue?

Dams can keep some fish from thriving – especially endangered species like the copper redhorse. When the historic Saint-Ours dam was rebuilt there was an urgency to make it fish friendly. Thus, the Vianney-Legendre fishway project was born. The fishway was constructed like a ladder, or series of pools built like steps. Fish inhabiting the Richelieu River climb the steps to reach the other side of the dam and their preferred breeding grounds at the Chambly rapids. However, since 2001, research has shown that whirlpools in the ladder can disorient some fish, causing them to expend energy, which jeopardizes their migration. For endangered fish, migration is essential to their survival. Improved design of the Vianney-Legendre fishway may be required to allow the copper redhorse to swim its way to recovery.

What's our approach?

- Use simulations to determine what is causing disorienting whirlpools in the fishway.
- Find strategies to reduce water current flow and eliminate vortices, allowing fish to rest and save energy during migration through the fishway.
- Implement practical solutions and monitor their effectiveness for the copper redhorse.
- Share results with visitors and the conservation community.

What's been accomplished?

- Conducted hydraulic simulations to evaluate ways to break up vortices in fishpond bays; based on simulations, made recommendations to improve the fishway.
- Hired engineering consultant to design deflectors and prepare plans and specifications for improving the fishway; deflectors to be installed in 2018 with further research planned to assess their impact and usefulness.

TOP The Vianney-Legendre fishway is being modified to better suit the needs of the endangered copper redhorse and other species. Photo: Eric Robichaud
BOTTOM Through a window installed in the fishway visitors can observe fish going up the Richelieu River.

** indicates the project has a species-at-risk focus*

Tidy tundra

*Cleaning up caribou habitat in Qausuittuq National Park**

Find out more

What's the issue?

Parks Canada made an important commitment to protect the endangered Peary caribou and its habitat when it established Qausuittuq National Park in 2015. The legacy of oil and gas exploration that occurred in the 1970s and 1980s – long before the park was established – left behind lots of industrial trash. The waste includes hundreds of fuel barrels, some empty and others full, and an estimated 244 square meters of debris. More than just an eyesore, the waste is seen by the Inuit community of Resolute as detrimental to Peary caribou and their habitat. In collaboration with Inuit partners, staff at Qausuittuq National Park aim to tidy up the tundra to benefit caribou and the ecosystem alike.

What's our approach?

- Consult with the Inuit community of Resolute and the Resolute Bay Hunter and Trappers Organization to build a strong partnership and base of support for clean-up activities.
- Remove 190 empty fuel barrels using air support from seven locations.

What's been accomplished?

- Built partnerships and a strong base of support within the community.
- Removed 194 empty fuel barrels with assistance from community members (2017).
- Discovered a previously unrecorded abandoned surveyor camp that requires additional clean-up work.

TOP Caribou spotted during a survey conducted in 2013. Photo: Morgan Anderson
BOTTOM Fuel barrels in Peary caribou habitat that were removed as part of the clean-up operation.

* *indicates the project has a species-at-risk focus*

From field to forest

Speeding up old field succession in Bruce Peninsula National Park

Find out more

What's the issue?

As in most of southern Ontario, early settlers to the area surrounding Bruce Peninsula National Park cleared forests to make way for agriculture. Since the park was established in 1987, parcels of adjacent land have been purchased in a bid to restore natural ecosystems and help protect the park. One 21.2-hectare hayfield acquired in 2011 is typical; after the forest was removed it was sown with non-native hay grasses and clover for livestock forage. Left alone, the old field would eventually shift back to forest – shrubs and trees replacing the grasses – but that would take centuries. Meanwhile, invasive grasses would continue to jeopardize the ecological health of the neighbouring forest. By accelerating restoration of the forest, Bruce Peninsula National Park aims to increase the ecological value of the land and provide visitors with opportunities to learn and participate in a hands-on conservation project.

What's our approach?

- Plan and initiate forest restoration to jump-start the process of old field succession throughout the 21.2-hectare parcel.
- Control the spread of non-native invasive grasses to protect the neighbouring forest from intrusion.
- Plant a diversity of locally sourced native tree and shrub species throughout the field.
- Provide meaningful opportunities to local youth by engaging them in restoration planting and site monitoring.
- Use local and social media to provide informative, regular updates on progress.

What's been accomplished?

- Removed 2.9 hectares of non-native invasive species around field perimeter.
- Planted 3,500 native trees and shrubs, including eastern white cedar, service berry and staghorn sumac.
- Monitored and maintained planted trees and shrubs to help ensure their successful establishment; documented results to learn and adaptively manage throughout project.
- Engaged Scouts Canada, a local high school and community members to assist with tree and shrub planting.

TOP Parks Canada staff assess the health of a recently planted white cedar sapling as part of the From Field to Forest restoration project. Photo: Zach Mielhausen
BOTTOM Fresh mulch is applied to recently planted saplings to help retain soil moisture and control weeds in an effort to restore an old hay field back to a forest.

The road to recovery

*Wildlife ecopassages in Bruce Peninsula National Park**

Find out more

What's the issue?

When frogs, salamanders, turtles and snakes try crossing busy roads, they often don't make it to the other side. Small and slow-moving, they're especially vulnerable to becoming roadkill – a common problem where these creatures move between habitats like wetlands and nesting grounds. Traffic mortality is a leading cause of decline for reptile and amphibian populations. Bruce Peninsula National Park is determined to solve the problem by identifying movement hotspots and building ecopassage underpasses for wildlife – including endangered snapping turtles and Massasauga rattlesnakes. Eliminating gruesome hotspots will help restore critical populations and conserve the diversity of wildlife on the Bruce Peninsula.

What's our approach?

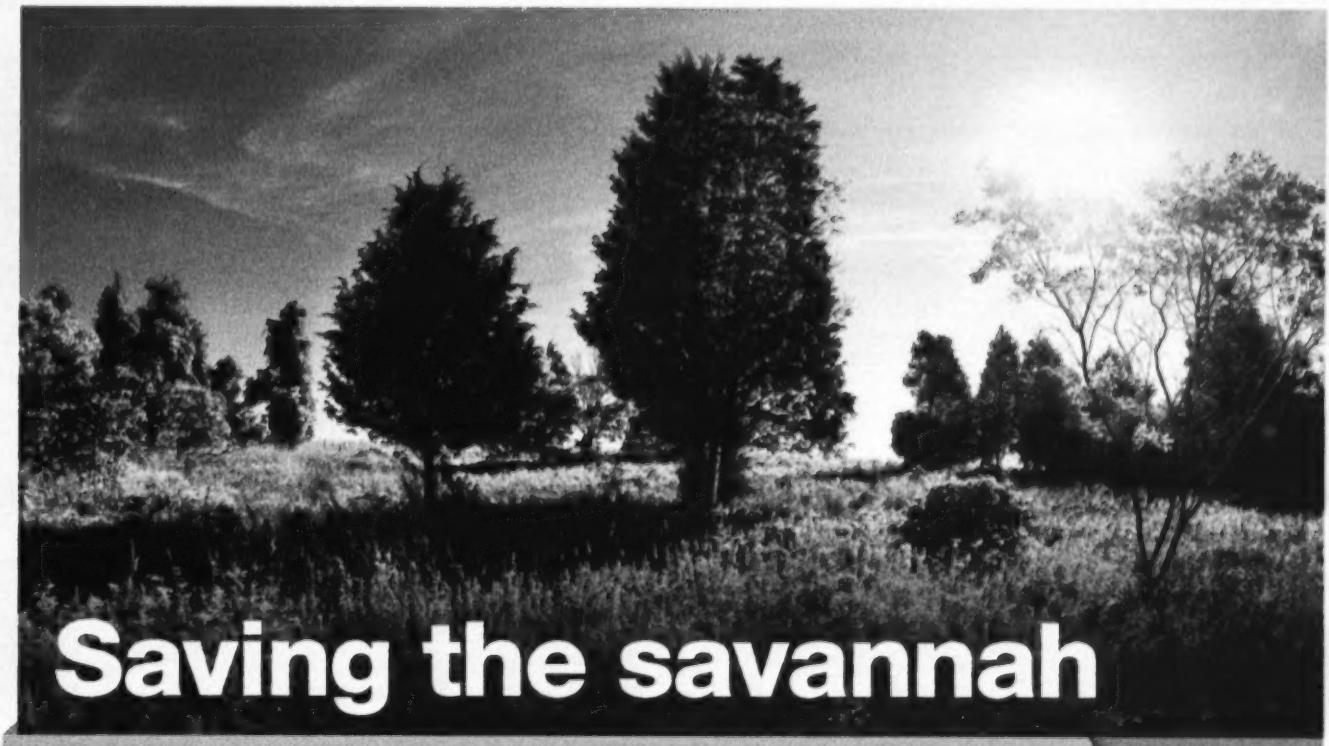
- Install deflection fencing to direct wildlife toward ecopassages and improve their effectiveness at reducing roadkill.
- Design and install improved ecopassages and deflection fencing at newly identified roadkill hotspots.
- Create artificial nest habitat in strategic locations to reduce the need for females (and hatchlings) to cross roads and risk injury or mortality.
- Design and initiate a monitoring protocol to evaluate the effectiveness of deflection fencing and ecopassages.
- Seek volunteers to help with restoration work and develop a citizen science turtle monitoring program to foster a connection among local residents and visitors.
- Educate visitors and local residents about the Massasauga rattlesnake to change perceptions, reduce persecution and enhance stewardship.

What's been accomplished?

- Engaged student volunteers from the local Outers Club to help install deflection fencing at hotspots along Dorcas Bay Road.
- Installed more than 1 km of deflection fencing on either side of five existing ecopassages and prepared designs for two new, larger ecopassages at roadkill hotspots.
- Completed four artificial nesting sites for turtles, and developed plans for four more to be installed in 2018.
- Developed a citizen science turtle monitoring program for launch in 2018.
- Connected with Canadians using social media and the internet to share information about road ecology, ecopassages, artificial turtle nests and hatchling turtles.

TOP Student volunteers assist Parks Canada staff with installing roadside deflection fencing to direct wildlife toward the ecopassages. Photo: Laura Sagermann
BOTTOM An ecopassage and deflection fencing designed to reduce reptile and amphibian roadkill. Photo: Tricia Stinnissen

* *indicates the project has a species-at-risk focus*



Saving the savannah

Restoring a rare habitat in Point Pelee National Park

Find out more

What's the issue?

Sandspit savannahs are rare ecosystems that depend on disturbance – fire, wind, ice and wave action – to maintain their open character. Changes in the frequency and severity of these disruptive forces, through actions such as fire suppression and shoreline alterations, has jeopardized the savannahs of Point Pelee National Park. The problem has been further compounded by the invasion of non-native plants, like spotted knapweed or white sweet clover. These are altering the favoured habitats of endangered species like eastern prickly pear cactus, five-lined skink and yellow-breasted chat.

What's our approach?

- Restore 24 hectares of savannah ecosystems, including 4 hectares of yellow-breasted chat habitat.
- Use a variety of methods like mechanical clearing, prescribed fire and herbicide application to mimic disturbance and control invasive species.
- Plant native species to hasten restoration.
- Engage visitors to learn about savannah ecosystems by offering hands-on experiences and sharing restoration stories.

What's been accomplished?

- Cleared overgrown and invasive species in 20 hectares of savannah and another 3 hectares of overgrown habitat in Anders Field for yellow-breasted chat nesting habitat.
- Collaborated with local schools to collect seeds, propagate seedlings and plant native species (cylindrical blazing star, butterfly milkweed) to accelerate restoration.
- Developed a new interpretive program for YMCA youth camp about the importance of savannah ecosystems; opened a new section of the multi-use Centennial Trail, providing views of newly restored savannah habitats.

TOP Panoramic view of Sparrow Field, a restored open savannah.
BOTTOM Fire crew members conduct a prescribed fire in February 2017 in the DeLaurier restoration area, an open savannah being restored.

Diversifying diluted genes

*Using conservation genetics to save trees in Point Pelee National Park**

Find out more

What's the issue?

Point Pelee National Park is home to some of the rarest species of trees in Canada: blue ash, butternut, red mulberry and Kentucky coffee-tree, to name a few. So uncommon are they that their genetic makeup has become a treasured liability. Without a diverse set of genes, species are susceptible to a multitude of stressors like exotic diseases, insect infestation or hybridization. The invasive and more common white mulberry, for example, is threatening the long-term survival of the native and less common red mulberry through its ability to hybridize and gradually dilute successive generations of red mulberry. With less than 20 trees remaining, the race is on for park staff to locate and save the remaining true genetic specimens – individuals that hold the promise of species survival.

What's our approach?

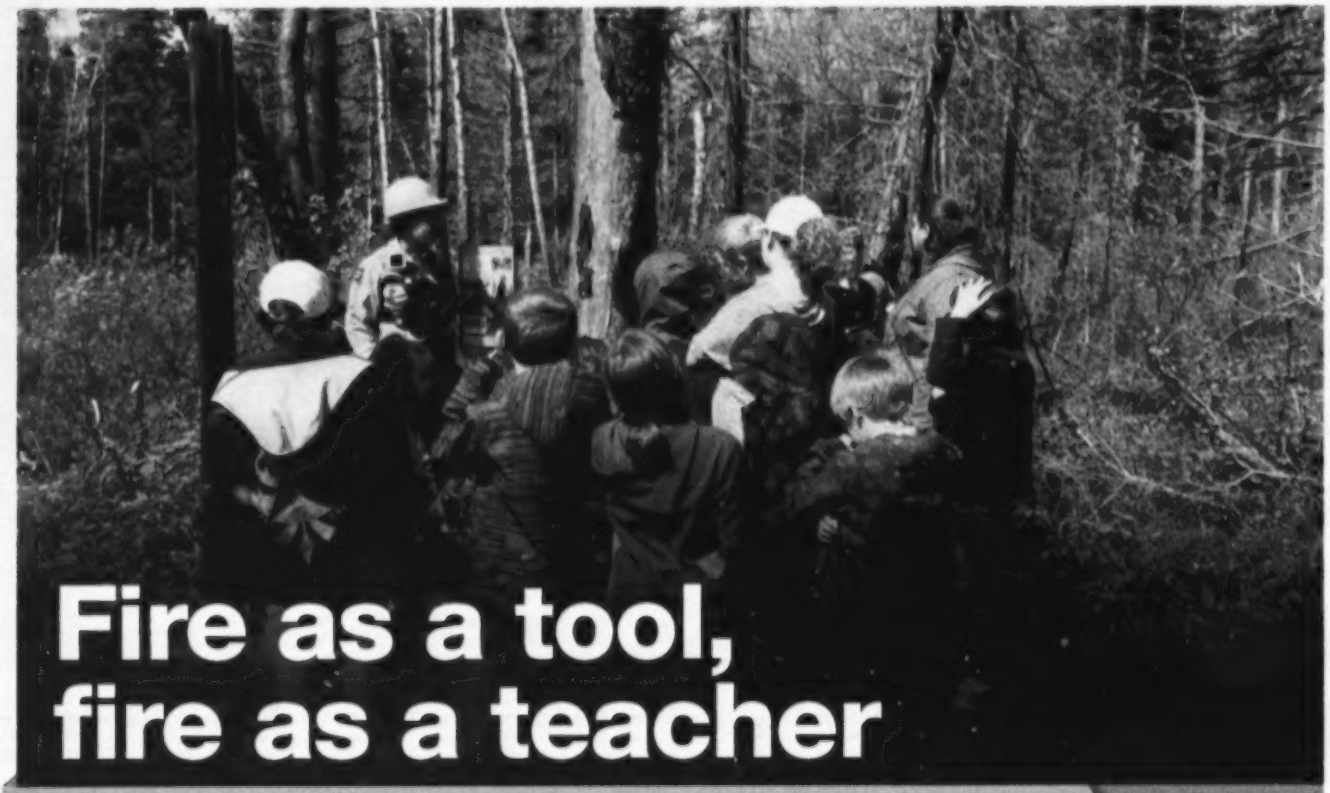
- Collaborate with other government and academic partners to research techniques for identifying and conserving the desired genetic strains of rare trees.
- Use controlled pollination, seed collection and propagation to increase the population of at-risk trees.
- Remove at least 90 percent of hybrid or non-native plants that are preventing rare trees from reproducing.
- Plant seedlings of greenhouse-propagated pure genetic stock in the park.
- Monitor the status of trees and adapt management strategies as new information is learned.
- Teach visitors and Canadians about the genetic conservation tools being used to identify and protect trees.

What's been accomplished?

- Worked with partners to identify and conserve rare trees – including the Forest Gene Conservation Association, Agriculture and Agri-food Canada, Trent University and Natural Resources Canada's National Tree Seed Centre.
- Propagated genetically pure, healthy strains of red mulberry and butternut in local greenhouses.
- Cleared 3.6 hectares of non-native species around 18 red mulberry trees; planted 26 genetically pure red mulberry seedlings.
- Educated Canadians via an exhibit on display in the park's Visitor Center and national, local and social media stories.

TOP Red mulberry seedlings in a local greenhouse following an experiment to produce genetically pure offspring. Photo: Vic and Darlene Bernky/ © Native Trees and Plants
BOTTOM Parks Canada staff plants a red mulberry seedling as part of an effort to conserve pure genetic strains. Photo: Brianna Jackson

* *indicates the project has a species-at-risk focus*



Fire as a tool, fire as a teacher

Using fire to connect Canadians to Pukaskwa National Park

Find out more

What's the issue?

The trees in Pukaskwa National Park are getting old, and the forest is less diverse and less healthy as a result. The cause in part is decades of fire suppression – a decision that slowly changed forest composition and hampered forest renewal. That's because many species rely on fire to thrive – jack pine seeds are released only when exposed to intense heat – and lots of wildlife come along for the ride; for example, black-backed woodpeckers feed on wood-boring insects found in burned forests. In response to a noticeable decline in forest health, Parks Canada started to light controlled or "prescribed" fires in Pukaskwa starting in the late 1990s, actively restoring the forest landscape. This change in strategy has also been used as a teaching opportunity; park visitors and others can now learn about the vital function of fire in forest renewal.

What's our approach?

- Restore the historic fire cycle by limiting suppression of wildfire.
- Develop prescribed fire plans that mimic the historic fire cycle.
- Apply fire to burn up to 850 hectares in the Willow Lake and Perry Lake area.
- Collaborate with researchers to enhance our understanding of fire in the region and adapt management.
- Provide new opportunities for visitors to enjoy the park while learning about fire and fire management at Parks Canada.

What's been accomplished?

- Completed plans to apply prescribed fire when conditions are right.
- Conducted prescribed fire near Willow Lake and protective guard burns at Perry Lake, totalling 228 hectares.
- Supported Lakehead University research comparing regional vs. local differences in fire severity, to better inform prescribed fire plans.
- Developed an exhibit promoting the ecological benefits of fire installed at the Canadian Bushplane Heritage Centre (2016) and the Land Use Summit at Pic Mobert First Nation (2017).
- Developed fire programming for visitors; New Beginnings provides students with a hands-on fire crew experience.

TOP Students participate in New Beginnings to learn how Parks Canada manages fire and understand its role in maintaining forest health.
BOTTOM A prescribed fire in 2014 near Willow Lake to help restore forests that had undergone decades of fire suppression from the 1960s to the early 2000s.

Recovery and discovery

Restoring the aspen parkland of Riding Mountain National Park

Find out more

What's the issue?

Riding Mountain aspen parkland is a unique ecological landscape – a prairie region where northern, western and eastern species all converge. The area's prairie wildflowers transition to aspen parkland, highland evergreens and lowland eastern hardwood forest. However, decades of fire suppression has had a negative effect on this ecoregion by reducing the extent and quality of its rough fescue grasslands and by causing its aspen forests to age with little new growth. The area's elk have less habitat as a result; elk are also threatened by bovine tuberculosis, a deadly infectious disease. The presence of white spruce plantations, invasive species and park developments are causing further issues.

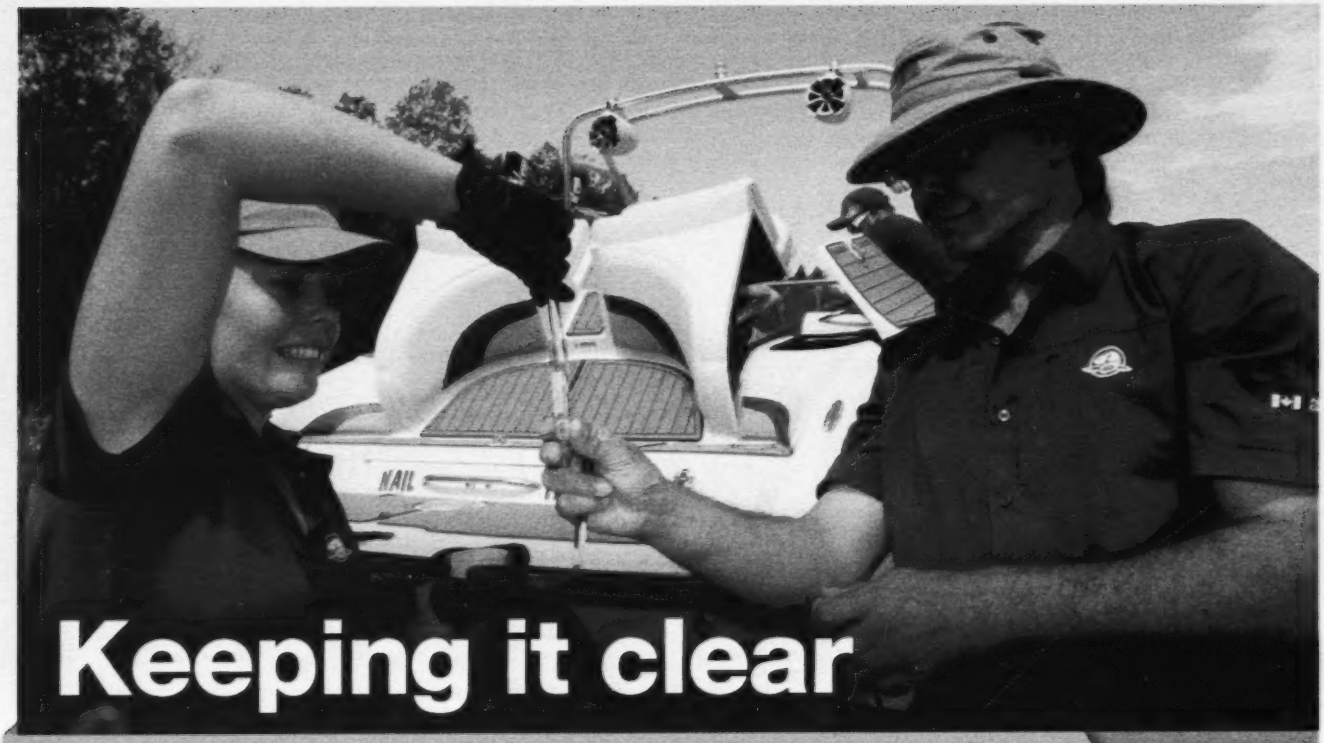
What's our approach?

- Use prescribed fire, plantation logging and site restoration (tilling soil, seeding of native grasses, invasive species management) to renew aspen forests and rough fescue grasslands.
- Work with Indigenous partners, neighbouring regions and other stakeholders to test for bovine tuberculosis and prevent its spread so that the disease is ultimately eradicated.
- Redesign the bison display with a wildlife-permeable fence to allow movement of other ungulates and predators such as bears and wolves.
- Raise public awareness of aspen parkland restoration through media and partnership opportunities.

What's been accomplished?

- Restored 1,250 hectares of aspen parklands using prescribed fire, and 40 hectares of rough fescue grassland by logging white spruce plantations, preparing the site and grass seeding.
- Worked with Keeseekowenin First Nation on wildlife health and monitoring programs, plantation removal, bison management and wildlife fencing projects.
- Detected no cases of bovine tuberculosis (since 2014) and maintained the elk population.
- Installed 4 km of wildlife-permeable fencing to permit the movement of predators.
- Showcased restoration efforts via Aspen Parkland travelling exhibits at the Manitoba Museum and Assiniboine Park Zoo.

TOP Children at Winnipeg's Assiniboine Park Zoo learning about Riding Mountain National Park's aspen parklands and bison herd. BOTTOM Parks Canada fire crew at an aspen parkland grassland, owned by the Nature Conservancy of Canada (Manitoba), assist in implementing prescribed fire as part of a partnering agreement to restore this habitat. Photo: Tim Gompf © NCC



Keeping it clear

Restoring Clear Lake in Riding Mountain National Park

Find out more

What's the issue?

When Riding Mountain National Park was established in 1933, society had a different perspective on how parks should be managed. In those days, the focus was on creating access and recreation for people, with little regard to the impact on ecosystems – including Clear Lake, a park centerpiece. Consequently, lakeshores were lined with cottages and roads, vegetation was cleared and boat ramps installed, wastewater effluent flowed, and connections with surrounding wetlands simplified. Clear Lake suffered. Aquatic habitats were lost, fish populations declined, water quality was jeopardized and invasive species loomed nearby. The modern view on park management means taking preventative action and restoring ecosystems where possible. So, park staff have embarked on an ambitious plan to clear up Clear Lake.

What's our approach?

- Collaborate with Keeseekoowenin Ojibway First Nation (KOFN) on a cooperative management agreement; bring awareness of the issues to all lake users and adjacent municipalities.
- Work with Clear Lake Golf Course to rehabilitate 3 hectares of Bogey Creek.
- Engage universities to improve understanding of water flow, nutrient inputs and water budgets; identify options to restore the linkage with South Lake.
- Prevent the establishment of invasive zebra mussels by educating visitors, inspecting boats prior to launch, and monitoring for early detection.

What's been accomplished?

- KOFN shared Indigenous knowledge about the whitefish and northern pike populations, helping to establish ecosystem health targets.
- Strengthened support from stakeholders and stewardship action outside the park; neighbours upgraded their waste disposal systems.
- Restored 3.78 hectares along Bogey Creek by cleaning up waste material at Grey Owl dump, re-contoured slopes, and re-vegetated the shoreline in day-use areas.
- Partnered with local universities to research restoring connections between Clear Lake, South Lake and Octopus Creek.
- Improved Boat Cove launch facilities; conducted 10,000 boat inspections for aquatic invasive species; decontaminated more than 500 vessels and monitored for zebra mussels.

TOP Parks Canada staff test a Clear Lake water sample for the presence of invasive zebra mussels. Photo: Chantal Skraba
BOTTOM Parks Canada staff measure water flow in Octopus creek. Photo: Chantal Skraba

Preserving prairie icons

*Recovering species at risk in Grasslands National Park**

Find out more

What's the issue?

Temperate grasslands are the most endangered biome on the planet. In Canada, about 70 percent of native prairie has been lost – mainly due to agriculture and oil and gas development. Throughout Grasslands National Park, established to protect mixed-grass prairie, ecosystem restoration efforts are aimed at reducing a legacy of threats that began before the park was established. These include invasion by non-native plant species (like leafy spurge), loss of characteristic species (like black-footed ferret), and the elimination of key ecological processes (like fire). While restoring the park helps the recovery of species at risk – greater short-horned lizard, burrowing owl, swift fox – it can also reconnect Indigenous peoples to the prairie landscape and strengthen the conservation ethic in park visitors and Canadians generally.

What's our approach?

- Manage the reintroduced plains bison herd size at a sustainable level (300–500 individuals).
- Plant or seed up to 75 hectares of silver sagebrush, nesting and feeding habitat for greater sage-grouse.
- Improve habitat quality in black-tailed prairie dog colonies by mowing or grazing, and replanting native species.
- Generally increase habitat availability for multiple species at risk by igniting prescribed fires over 400 hectares of grassland.
- Reduce the risk of wildlife collisions by removing fences or marking them to increase visibility.
- Engage Canadians in mixed-grass prairie conservation by building new, and improving existing park infrastructure, enhancing programing and reaching out with traditional and social media.

What's been accomplished?

- Maintained bison numbers at a herd size within the sustainable target each year.
- Planted and seeded over 42 hectares of silver sagebrush in 2016 and 2017.
- Applied prescribed fire to 106 hectares in 2015 and 13 hectares in 2016 to reduce invasive leafy spurge, smooth brome and crested wheatgrass, and to an additional 137 hectares in 2016 to create new black-tailed prairie dog habitat.
- Removed or marked 93 km of fencing (2015–2017), reducing the likelihood of wildlife collisions.
- Raised public awareness about mixed-grass prairie conservation by increasing visitor engagement by 55 percent, creating three new volunteer programs, publishing nine media stories and increasing Facebook likes by 34 percent.

TOP A volunteer adds plastic tags to a fence to increase visibility and reduce wildlife collisions by species like the greater sage-grouse. Photo: L. Gardiner
BOTTOM The Western Heritage Experience, a program created that enhances awareness on the important role that ranching plays in grassland conservation.

** indicates the project has a species-at-risk focus*

Reconnecting grasslands, bison and people

Ecosystem restoration in Prince Albert National Park

Find out more

What's the issue?

Plains bison rely on grasslands for grazing. Yet less than 6 percent of Saskatchewan's original grasslands remain. Land conversion to agriculture in the 1800s throughout the region was an initial cause of loss. More recently, fire suppression has caused aspen forests to grow where mixed fescue grasslands used to be – a change that affects Prince Albert National Park's population of free-ranging plains bison, where a decline has been observed since 2005. Aside from undesirable habitat change, the herd has also weathered natural predation, spikes in disease (anthrax) and harvest pressure outside the park boundaries. Attracted to forage crops on neighbouring lands, bison can cause damage, which leads to conflicts with landowners. Practical solutions are required to benefit the grasslands, bison and people alike.

What's our approach?

- Collaborate with local landowners, Indigenous groups and other stakeholders to increase stewardship of free-ranging plains bison.
- Restore two gravel pits by increasing vegetation cover to 90 percent and reducing invasive species to 25 percent at each site.
- Monitor bison to inform prescribed fire plans; pilot diversionary fence designs to dissuade bison from leaving the park.
- Use prescribe fire to restore 3,600 hectares of aspen parkland and 50 hectares of mixed fescue grasslands.
- Inform visitors about grassland and aspen parkland ecosystems protected by Prince Albert National Park.

What's been accomplished?

- Continued a dialogue with private landowners, Indigenous groups and the Saskatchewan Ministry of Environment to ensure support for sustainable bison management.
- Restored two gravel pits to fescue grassland, with plans to monitor their success in 2018.
- Tracked 10 GPS-collared bison and completed aerial surveys to assess the status of the bison population and their response to management actions being implemented by the park.
- Burned 800 hectares of aspen parkland and 51 hectares of mixed fescue grassland.
- Improved the Valleyview Trail and delivered the Bison Will Rise Again musical for visitors to learn about grassland and aspen parkland ecosystems.
- Supported cultural camps led by an elder of the Ahtahkakoop Cree Nation who shared Indigenous knowledge with local Indigenous youth about bison and grassland ecosystems.

TOP Fire crew prepares for the South End prescribed fire to restore aspen parkland. Photo: Shannon Bond
BOTTOM Diversion fences installed at key locations along the Sturgeon River are showing early signs of success at deterring bison from leaving the park.

Igniting restoration

Using fire to restore mountain park ecosystems

Find out more

What's the issue?

While the thought of uncontrolled fire can be frightening, forest and grassland fires are a type of disturbance to which many natural communities are highly adapted, including those in the mountain parks. Without regular burning, fire-adapted vegetation communities change for the worse; wildlife habitats become less diverse, forests become susceptible to disease, and there's an increased chance of catastrophic wildfire due to an accumulation of woody fuels. To reverse these negative consequences, Parks Canada uses carefully planned and controlled "prescribed" fires to burn off dense shrubs, open up forest canopies, trigger seed germination and stimulate plant regeneration. Prescribed fire is a technique that's expertly practiced by Parks Canada to mimic natural processes and restore forest and grassland ecosystems.

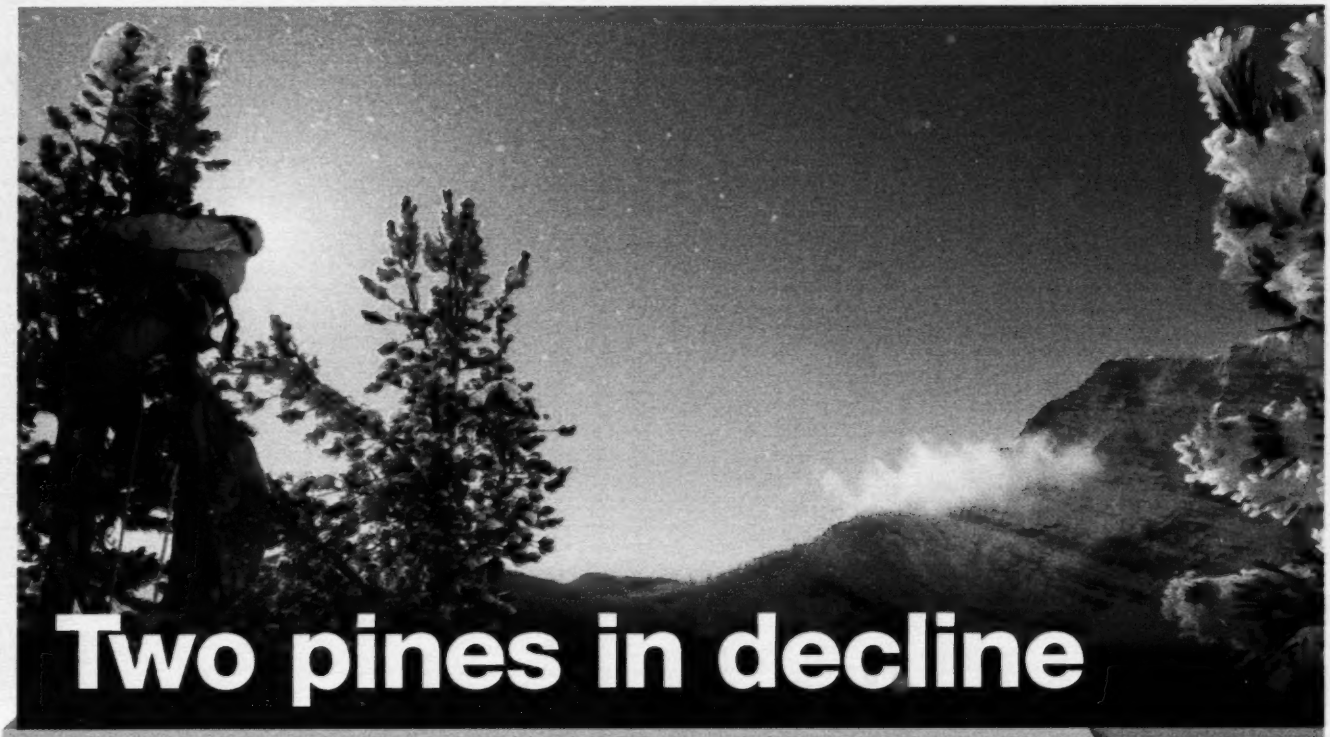
What's our approach?

- Research historic fire cycles (frequency, area, intensity) and aim to mimic a minimum of 20 percent of those patterns across the mountain parks.
- Coordinate the use of prescribed fire annually to restore ecosystems and maintain native biodiversity.
- Develop interpretative programs to show Canadians the benefits and importance of fire, while raising awareness about the use of prescribed fire in ecosystem restoration.

What's been accomplished?

- Conducted forest thinning and protective guard burning to ensure prescribed fires are well contained, minimizing any risk to public health and safety.
- From 2015 to 2017, ignited nine carefully planned prescribed fires in the montane forests of four national parks, restoring 135 hectares in Kootenay, 733 hectares Jasper, 1,360 hectares in Banff and 68 hectares in Mount Revelstoke.
- In 2017, lit an additional 63 hectares of prescribed fire across complex, front-country areas in Banff National Park to restore ecosystems while reducing the risk of future wildfires.
- Delivered travelling exhibits and interpretive displays – including What's the Connection and Sparks in the Parks – that have reached more than 100,000 people.
- Shared with Canadians engaging stories on mountain park fire management through local, regional and national media (CTV, CBC, Discovery Channel), open houses and community meetings.

TOP Aerial view of ignition on the Jackladder prescribed fire in Jasper National Park.
BOTTOM A Parks Canada interpreter high fives a young visitor at a fire exhibit in Jasper National Park.



Two pines in decline

*Recovering whitebark and limber pine in seven national parks**

Find out more

What's the issue?

As keystone species of high-elevation forests in Western Canada, whitebark and limber pine both have beneficial influences on other species and natural communities. For example, their seeds are nutritional foods for birds, squirrels and bears; their growth influences snowmelt, soil development and the habitat conditions of other subalpine plants. When the health of whitebark and limber pine suffer, so too do the species and ecosystems they support. That's what's happening in the mountain national parks. The two pines are in decline across Banff, Jasper, Kootenay, Yoho, Mount Revelstoke, Glacier and Waterton Lakes national parks. Both are threatened by a combination of blister rust (a Eurasian fungal disease), mountain pine beetle outbreaks, historic fire suppression and stresses exacerbated by climate change, such as drought.

What's our approach?

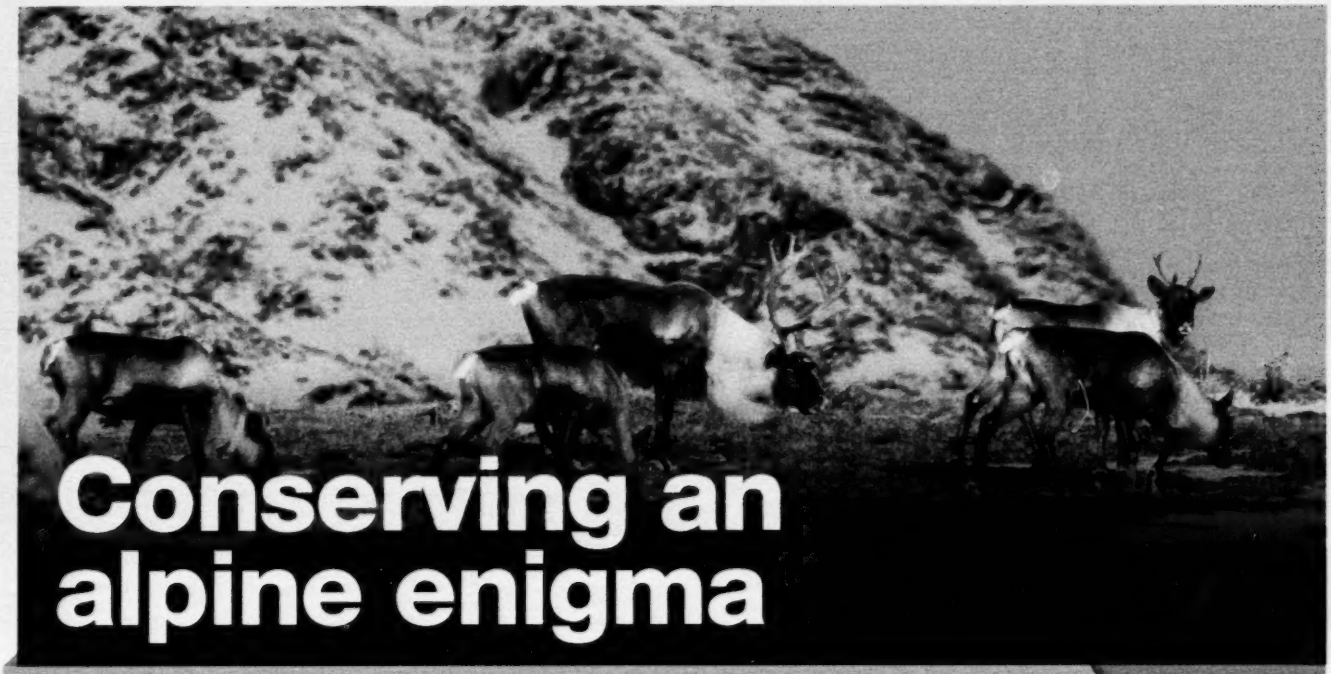
- Conduct blister rust surveys to identify potentially resistant trees, called "plus trees".
- Use pheromones to protect plus trees from the mountain pine beetle.
- Collect seeds and grow seedlings from plus trees; conduct further testing of genetic resistance to blister rust on seedlings.
- Use prescribed fire and thinning to maximize resilience in forest stands under threat.
- Improve species inventory and mapping to help prioritize future actions.
- Provide opportunities for visitors to learn about and participate in conservation programs.

What's been accomplished?

- Identified roughly 353 whitebark and 45 limber pine plus trees across the seven parks; collected seeds from 165 of these trees; sent more than half for rust-resistance testing.
- Used pheromones to protect more than 250 plus trees from mountain pine beetle attacks.
- Used prescribed fire across more than 1,100 hectares of whitebark pine and 7 hectares of limber pine habitat; thinned 12 hectares of pine habitat to reduce competition and wildfire risk.
- Planted roughly 7,500 whitebark and 2,750 limber pine (2013–2017), with first-year survival rates of more than 90 percent.
- Developed interpretive programs – Indiana Cones and the Quest for the Keystone and Gnarly Pines – both of which won awards from Interpretation Canada.

TOP Parks Canada staff collecting whitebark pine cones that will be tested for blister rust resistance, a tactic to restore the species in Waterton Lakes and six other mountain national parks. BOTTOM A field worker plants whitebark pine seedlings in an attempt to grow trees with resistance to the deadly blister rust, Mount Revelstoke National Park.

** indicates the project has a species-at-risk focus*



Conserving an alpine enigma

*Southern mountain caribou recovery in four national parks**

Find out more

What's the issue?

Mysterious and rarely seen, the southern mountain caribou of Banff, Glacier, Jasper and Mount Revelstoke national parks are ghost-like enigmas. Highly adapted to the alpine environment, the species needs large swaths of mountainous terrain, undisturbed old forest habitat, an abundance of lichen to eat and relative freedom from predators. But conditions are changing and mountain caribou are declining in turn. Deer, elk and moose have become more common in the parks, which has attracted predators (wolf, bear) and increased the mortality of caribou – especially their vulnerable calves. Disturbing caribou during the critical winter season is also known to stress them. Backcountry recreation (skiing, snowshoeing) can unintentionally push caribou off their favoured habitats, causing them to use energy reserves and lowering their chance of survival. Winter recreation trails are also used by wolves, further increasing the chance of predation. If this secretive species is to survive, we need to better understand their needs, carefully manage their habitat and boost the population. We will also likely need a bit of luck.

What's our approach?

- Collaborate with provincial and local stakeholders to develop and implement conservation actions.
- Monitor caribou and wolf populations to determine size and movement patterns.
- Support the Revelstoke Caribou Rearing in the Wild project penning pregnant females to improve calf survival.
- Restrict access to important habitat during sensitive times.
- Connect with Canadians using new and traditional media; engage visitors and volunteers in caribou conservation.

What's been accomplished?

- Consulted with Indigenous groups and stakeholders on caribou conservation; finalized multi-species action plans for Banff, Glacier, Mount Revelstoke and Jasper national parks.
- Collected population and movement data on caribou (using scat, aerial surveys) and wolves (using cameras, GPS collars).
- Collaborated with community partners and the Splatsin (Yucwmenlúcwu) to improve calf survival in the Columbia North herd (from about 25 to 43 percent, 2015–2017).
- Deployed interpreters and enforcement staff to increase visitors' compliance with winter closures at Maligne Lake in 2016–2017.
- Raised awareness about caribou conservation (reached 100,000 people) through the What's the Connection? travelling exhibit, volunteer opportunities and educational programs.

TOP Rarely seen southern mountain caribou grazing in the Tonquin Valley, Jasper National Park. Photo: Layla Neufeld BOTTOM Pregnant southern mountain caribou are released into the safety of the maternity pen to increase calf survival as part of the Revelstoke Caribou Rearing in the Wild project. Photo: Rob Buchanan

** indicates the project has a species-at-risk focus*

Rescue the fescue

Restoring grasslands in Waterton Lakes National Park

Find out more

What's the issue?

The health of the grasslands in Waterton Lakes National Park has been declining since the late 19th century. Roughly 25 percent of grasslands in the lowest elevations have been colonized by shrubs and aspen forest since 1889. The main causes are a lack of fire and grazing bison; an increase in invasive plants has also taken place. Today, 10 percent of Waterton's estimated 1,100 plant species are non-native, and many of these are harmful to grassland health and biodiversity. Representative of the ailing grassland is the status of the northern leopard frog. Threatened in Alberta, northern leopard frogs form important links between wetland and grassland habitats, moving between the two for reproduction and feeding. On the decline since the 1970s, they disappeared from the park in 1980.

What's our approach?

- Reverse the declining trend of the park's grasslands by 2019.
- Remove priority invasive plants, like spotted knapweed, and re-vegetate disturbed sites with native plants grown from locally collected seeds.
- Restore prescribed fire as a process on the landscape to reduce tree and shrub encroachment.
- Re-establish northern leopard frog by transferring eggs from healthy populations in Grasslands National Park.
- Engage Canadians through outreach, interpretation, education and volunteer opportunities.

What's been accomplished?

- Developed and implemented an invasive plant-management system.
- Controlled invasive plants on 1,327 hectares of grassland habitat.
- Collected seeds from 48 native grass and wildflower species, and planted 5,500 plugs on 2 hectares of disturbed grassland; established a climate-controlled native plant seed storage facility to support restoration work.
- Used prescribed fire to reduce tree and shrub encroachment in 1,571 hectares of grassland, and used satellite and drone imagery to monitor results.
- Recorded northern leopard frog breeding in the park for the first time since the 1970s.
- Engaged more than 200,000 Canadians in grassland conservation and restoration learning, and volunteer opportunities such as our award-winning Ecosystem Investigator Camp.

TOP Parks Canada staff and volunteers plant foothills rough fescue plants to restore a former gravel pit. Photo: Kimberly Pearson
BOTTOM A young northern leopard frog, hatched from eggs transferred from Grasslands National Park, has helped re-establish the species. Photo: Jasper Angel

Historic homecoming

*Reintroducing bison to Banff National Park**

Find out more

What's the issue?

Over 140 years ago, plains bison were hunted nearly to extinction throughout the Great Plains and the eastern slopes of the Continental Divide, including the area that later became Banff National Park. The consequences have been significant, including reduced biodiversity and a loss of ecosystem function. As a keystone species, bison have a disproportionately large influence on other species and natural communities. Their presence on the landscape helps maintain habitat diversity for an array of plants and animals, especially grassy meadows, and the movement of bison herds redistributes nutrients and energy resources throughout the ecosystem. Their loss has also deeply affected Indigenous peoples, who have vital cultural connections with bison. In short, the absence of plains bison in Banff has created a cascade of adverse ecological and cultural impacts.

What's our approach?

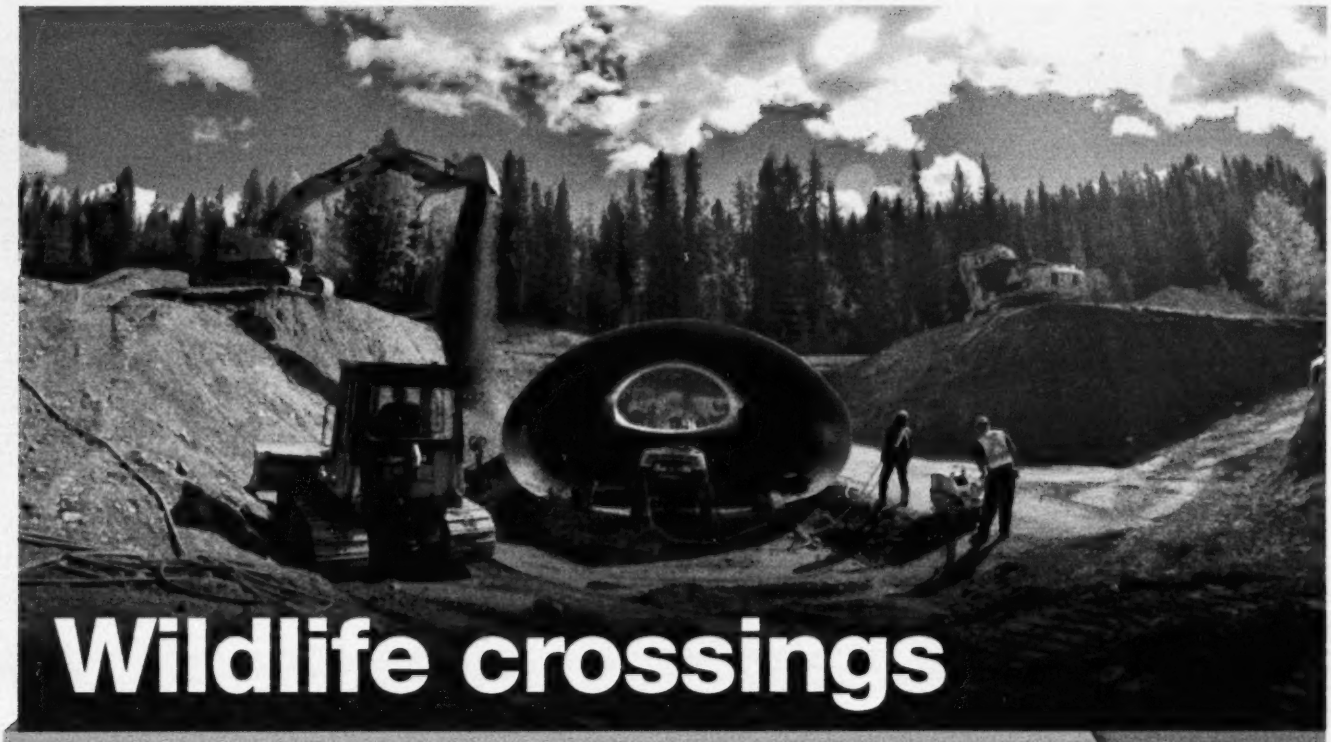
- Consult with Indigenous peoples, governments and experts (e.g. Elk Island National Park, bison producers) to plan the reintroduction.
- Monitor ecosystems to compare changes before and after the reintroduction of bison.
- Burn 1,500 hectares of meadow communities to improve forage for grazing.
- Reintroduce 16 plains bison to a fenced pasture, eventually releasing the herd so they are free roaming.
- Use natural features and deflection fencing to discourage bison excursions and ensure fence is permeable for other large mammals.
- Achieve a breeding population of 30 bison by the year 2022.
- Share progress throughout the project often and broadly.

What's been accomplished?

- Consulted with Indigenous groups, the public and others, resulting in an improved reintroduction plan.
- Completed two years of baseline monitoring of pre-release ecosystem conditions.
- Ignited prescribed fires across 865 hectares to improve the quality of meadow communities.
- Reintroduced 10 females and six males to a 6-hectare fenced-in pasture in February 2017, subsequently moving them to a 12-hectare natural pasture in summer 2017.
- Hosted two Indigenous ceremonies, providing the herd with the proper spiritual welcome following an absence of over 140 years.
- Tested fence designs to discourage bison from leaving the reintroduction area.
- Increased herd size to 26 with the birth of 10 healthy calves in May 2017.
- Celebrated our achievements with Canadians by connecting with over 800,000 virtual visitors.

TOP Three of 10 plains bison calves born to reintroduced mothers in May 2017. Photo: K. Heuer BOTTOM Parks Canada fire crew member lighting a prescribed fire in meadows to promote spring growth and enrich grazing opportunities for reintroduced plains bison. Photo: Dan Rafla

* *indicates the project has a species-at-risk focus*



Wildlife crossings

Building bridges for wildlife in Kootenay National Park

Find out more

What's the issue?

Collisions between vehicles and wildlife pose a serious risk for animals and motorists alike. Highway 93 South in Kootenay National Park is particularly dangerous; from 2003 to 2012, over 500 large mammals were killed. It is likely that many more collisions were unreported and the animals never found. Attempts to prevent collisions – such as adding impermeable fencing to keep animals off roads – fragments the landscape and disrupts wildlife movements. To ensure both highway safety and wildlife connectivity, neighbouring Banff National Park uses wildlife exclusion fencing in combination with overpasses and underpasses, enabling wildlife to safely move across the landscape. With traffic projected to increase, Kootenay proposed a multi-phase project modelled on the Banff experience to reduce collisions between wildlife and vehicles.

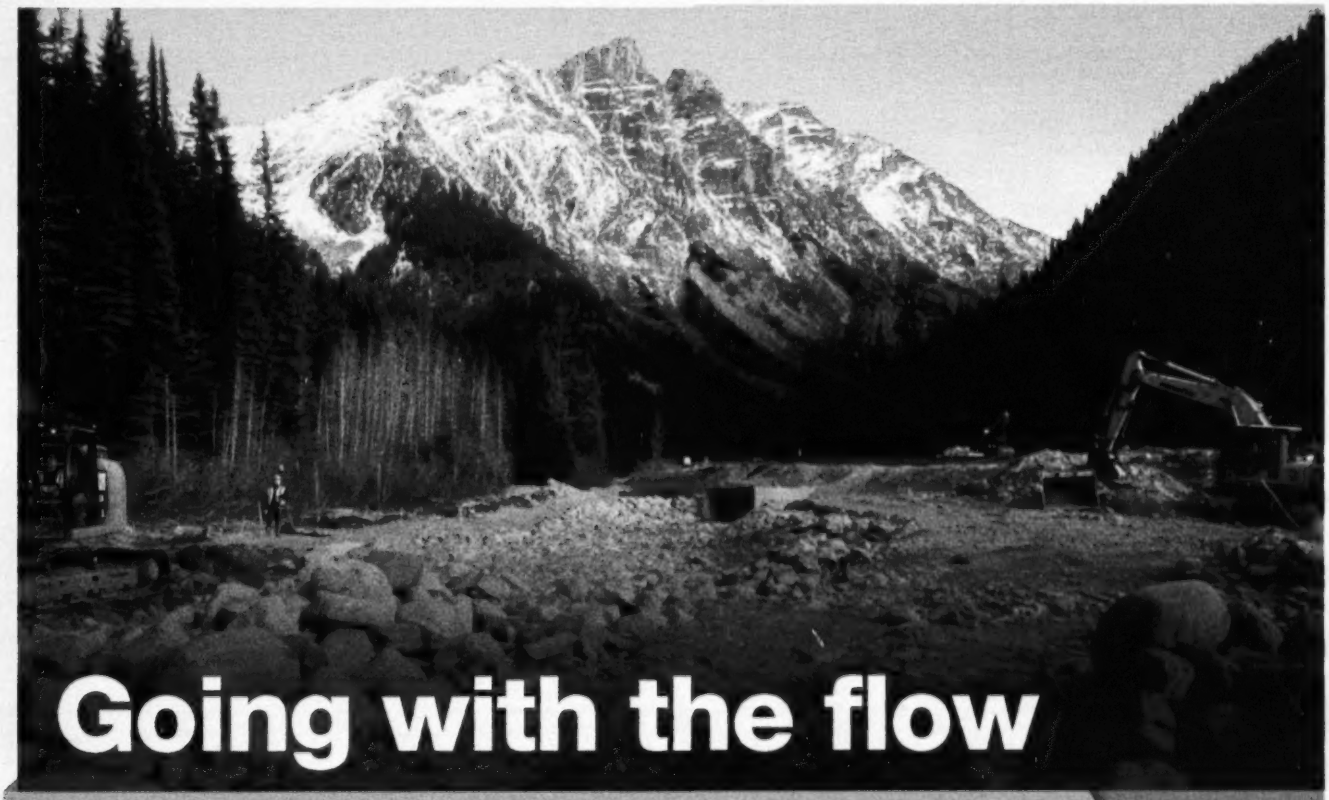
What's our approach?

- Determine the locations of collision hotspots along the Highway 93 South corridor.
- Evaluate the feasibility of building additional wildlife underpasses and exclusion fencing.
- Apply the lessons learned in phase one for locating wildlife gates – features in the fence that allow wildlife accidentally trapped on the highway side to get back to safety.
- Develop a wildlife monitoring program; evaluate wildlife collision rates after fencing is constructed; determine effectiveness of underpasses.
- Communicate the project's goals and successes with visitors.

What's been accomplished?

- Installed a total of 15 km of fencing and nine wildlife underpasses.
- Fitted 59 wildlife gates to fences; prevented all but two wildlife mortalities since construction was completed (June 2016 to March 2018).
- Monitored nine wildlife underpasses with remote cameras; documented over 3,500 safe passages by deer, moose, wolves, bear and cougar.
- Developed visitor engagement displays and promotional materials, including exhibits at a highway rest stop, at Science World in Vancouver, and through online videos and social media.

TOP An elliptical culvert-style underpass being built along Highway 93 South in 2015.
BOTTOM A bull moose crosses under Highway 93 South through an underpass.



Going with the flow

Reconnecting waterways for fish in Glacier National Park

Find out more

What's the issue?

Fish that swim up and down mountain streams to access different habitats are synonymous with flowing waters. When water flow is impeded by non-natural barriers – like dams, weirs and culverts – fish populations and ecosystems suffer. The fish of Connaught Creek, in Glacier National Park, have faced several such barriers over the years. For example, the Trans-Canada highway blocked fish movement along the creek until park staff had a large, fish-friendly box culvert installed. Reconnecting previously subdivided habitats now allows fish free passage under the road. Further upstream, a weir installed in 1982 to provide power and potable water to Rogers Pass still stops fish from navigating their way to high-quality habitat. Removing this hurdle would improve habitat connectivity for fish, allowing them to go with the flow.

What's our approach?

- Increase the accessibility of upstream fish habitat in Connaught Creek by designing and constructing a new passive water-delivery system that draws water directly from the stream and does not require a weir and reservoir.
- Remove the weir and restore the stream profile once a passive water collection system is installed.
- Restore aquatic and streamside habitats, fish connectivity and stream integrity by removing wood and concrete weir and re-planting the banks of the creek.
- Share stories of aquatic restoration through social media, outreach initiatives and in-park messaging.

What's been accomplished?

- Developed conceptual designs for weir removal and the new passive water-delivery system.
- Began design contracting process and plans for a new water delivery system and stream restoration to be completed over the next couple years.
- Combined two separate projects (new culvert installation and removal of weir) and their funding to work toward a common goal.
- Featured aquatic restoration in the Rogers Pass Discovery Centre in summer 2017 with a 3-D model to demonstrate how replacing culverts improves water flow under highways.

TOP A culvert being replaced on the Trans-Canada highway, where it crosses Connaught Creek, to restore fish passage.
BOTTOM The weir on Connaught Creek slated for removal to restore aquatic connectivity and allow upstream and downstream movement by fish. Photo: A. Rand

Propagating success

*Recovering species at Fort Rodd Hill National Historic Site and Gulf Islands National Park Reserve**

Find out more

What's the issue?

In British Columbia, the coastal Douglas-fir ecological zone (CDF) is the smallest and rarest of the province's 16 ecological zones. Despite its rarity, the CDF has the highest native plant diversity and is home to a whopping 225 species at risk, including those found in Garry oak habitat. Over 150 invasive species introduced by humans threaten the CDF region, coupled with the fact that 75 percent of BC's 4.6 million residents live within the CDF. The CDF is 80 percent private land and the least protected ecological zone in the province. All these facts signify the importance and value of protection and restoration of the CFD by Parks Canada at both Fort Rodd Hill National Historic Site and Gulf Island National Park Reserve.

What's our approach?

- Remove invasive plant species, such as Scotch broom, from Fort Rodd Hill to restore Garry oak habitat.
- Use prescribed fire to restore ecological processes, an eco-cultural practice once used by Indigenous people.
- Grow species at risk in a plant nursery for replanting.
- Plant native rare plants or seeds to increase existing populations or establish new populations.
- Involve visitors, volunteers, the public and Indigenous partners in restoration work.

What's been accomplished?

- Removed invasive species from 54 hectares at Fort Rodd Hill, and eight islets in Gulf Island National Park Reserve.
- Used prescribed fire on Tumbo Island to restore and better understand its influence in Garry oak habitat (2016); involved academic, Indigenous and regional partners.
- Propagated 13 federal species at risk in a nursery at Fort Rodd Hill, including deltoid balsamroot; transplanted seedlings to expand this population from three to 200.
- Scattered 15,000 seeds of slender popcorn flower on Saturna Island to augment an existing population, and nursery-grown seed to a population of Macoun's meadowfoam, which grew from 800 to 2,556 plants.
- Engaged 667 volunteers and 5,000 Canadians and international visitors through events and programming in 2016 and 2017.

TOP Students celebrate their hard work of removing invasive species.
BOTTOM Nursery-produced seeds are being used to recover the endangered deltoid balsamroot. Photo: Nathan Fisk

** indicates the project has a species-at-risk focus*

Listening to the sea, looking to the future

Clam garden rejuvenation in Gulf Islands National Park Reserve

Find out more

What's the issue?

Since ancient times, the Coast Salish peoples have cared for and relied on beaches to provide a healthy, nutritious supplement to their diet. Using practices passed down through generations, they cultivate intertidal ecosystems by removing sea lettuce and tilling beach sand. These practices encourage growth of many valuable food species in the shallow coastal waters. Building rock walls near the lowest tide-mark helps trap sand and sediment, and create a terrace on the landward side – a perfect environment for clams to grow. Once established, these "clam gardens" support many more clams than unmodified beaches. This cultivated balance has been interrupted in more recent history. But staff in Gulf Islands National Park Reserve, and the W̱SÁNEĆ and Hul'q'umi'num Nations of the Coast Salish people, are restoring these eco-cultural systems and rejuvenating this ancient practice.

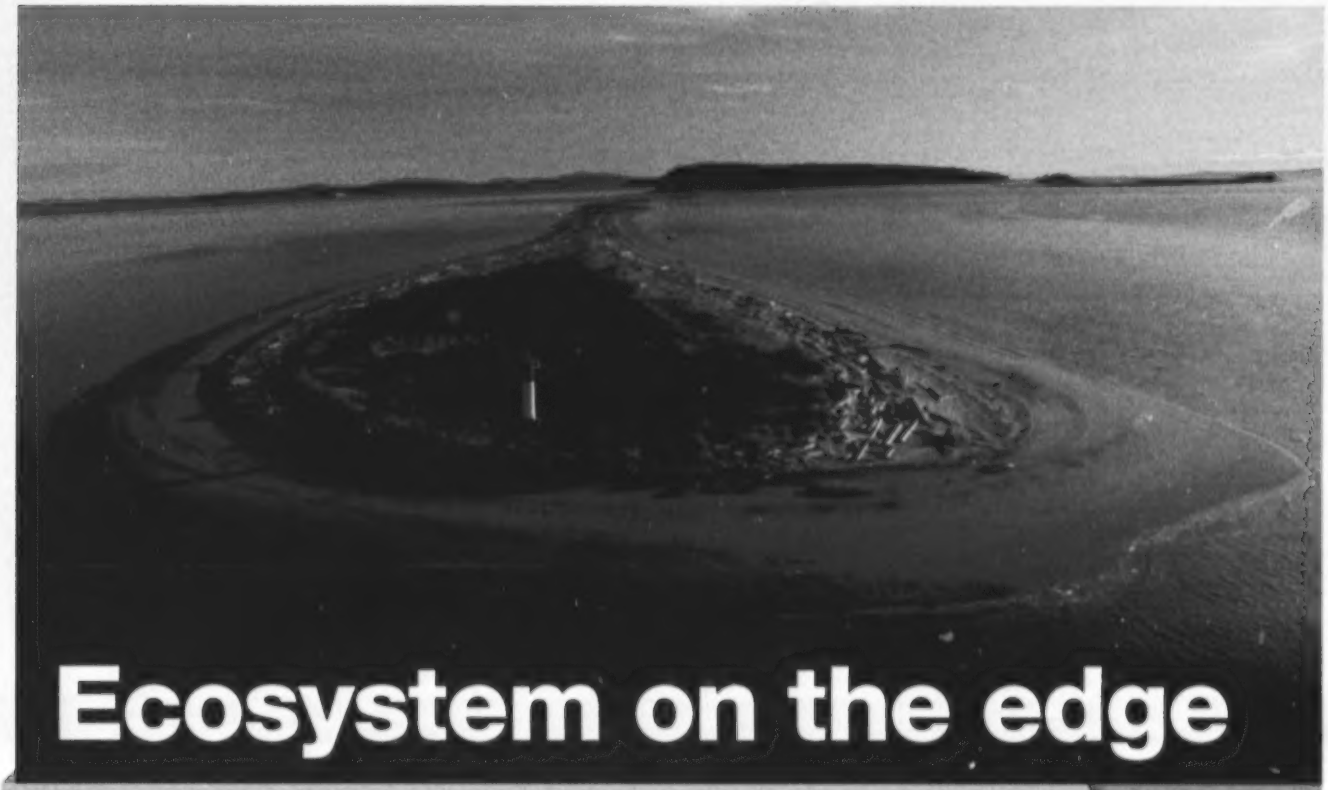
What's our approach?

- Cooperate with W̱SÁNEĆ and Hul'q'umi'num Nations to re-establish traditional practices in intertidal ecosystems.
- Enhance ancient clam gardens by rebuilding 275 metres of wall by 2019 and tilling 350 square metres of beach each year.
- Monitor and research the role of clam gardens in restoring intertidal ecosystems.
- Engage visitors and communicate the role of humans (Indigenous peoples, new settlers, Parks Canada) in intertidal ecosystems through social media and outreach activities.

What's been accomplished?

- Engaged W̱SÁNEĆ and Hul'q'umi'num Nations to lead planning and restoration activities.
- Built 145 metres of clam garden wall and reached the target area of beach tilling for three consecutive years.
- Began monitoring clams, algae and sediments, and mapped clam gardens using drone technology.
- Conducted underwater mapping and excavations, and collected samples for radiocarbon dating at two clam gardens – anticipated to be much older than the current estimates of 1,000 to 1,700 years old.
- Attracted 110 participants to the 2017 Science and Culture camps; reached 14,000 people at many venues, including Vancouver Aquarium, Shaw Centre for the Salish Sea, and Coast Salish Campfires in 2017.

TOP A clam garden at Fulford Harbor. Photo: Iain Robert Reid
BOTTOM Harvesting clams as part of Hul'q'umi'num Science and Culture Camp, spring 2016. Photo: Hugo Wong



Ecosystem on the edge

*Restoring ecosystems and species in Gulf Islands National Park Reserve**

Find out more

What's the issue?

Sidney Island, in Gulf Islands National Park Reserve, protects rare coastal sand ecosystems, where marine and land environments meet. These habitats are typically kept open and ever-changing because of frequent disturbance from wind and waves. In recent years, invasive plants, like Scotch broom and European beach grass, have been moving in and stabilizing the shifting sands. This change is threatening the ecosystem and the survival of several rare species, including the common nighthawk, the silky beach pea and the contorted-pod evening-primrose, which depend on an open sand habitat. Parks Canada is taking practical action to save this ecosystem and these species from going over the edge.

What's our approach?

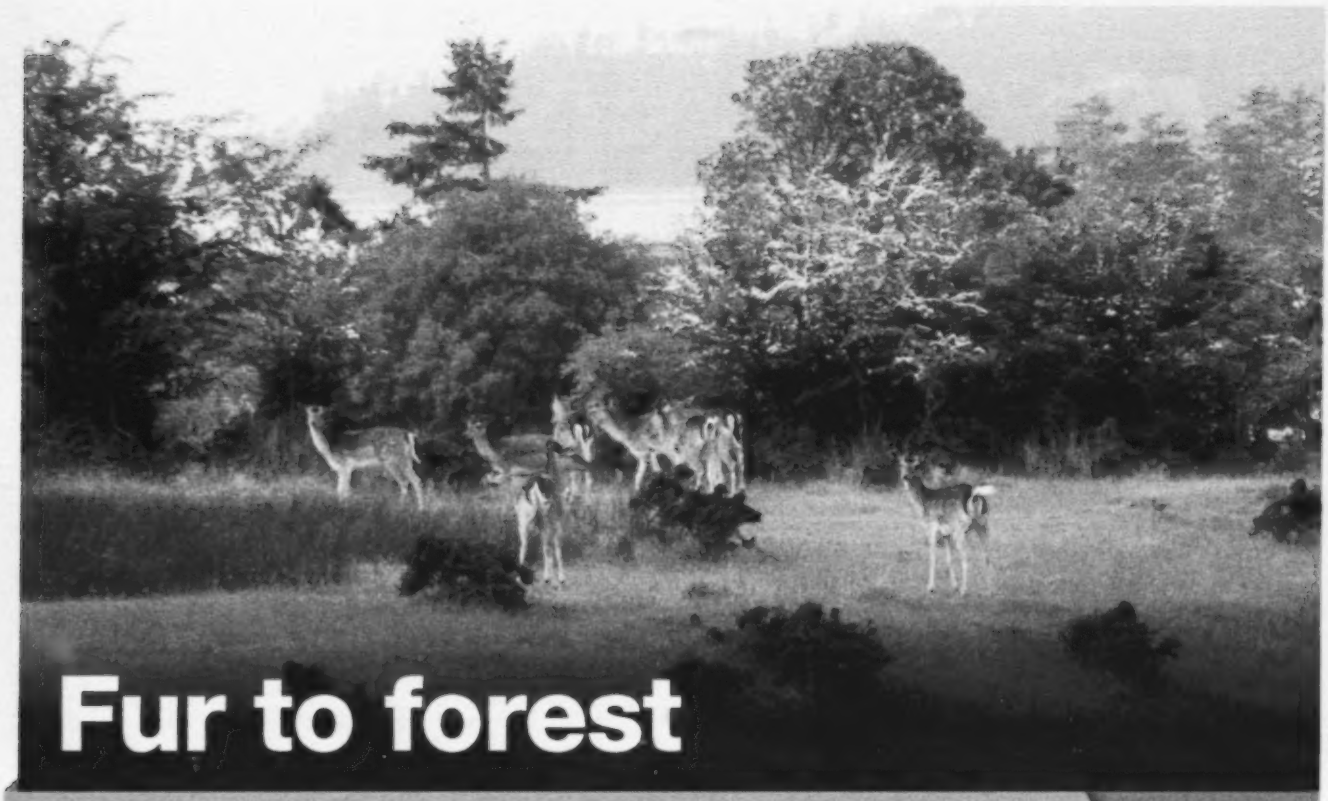
- Remove priority invasive plant species, including Scotch broom and European beach grass, from rare coastal sand ecosystem on Sidney Spit.
- Increase rare plant populations by sowing nursery-grown seed into prepared habitat.
- Install fencing and signage to improve site protection and enhance visitor facilities and learning opportunities.
- Foster engagement with volunteers and partners to contribute to the project; collaborate with other organizations in the region involved in coastal sand ecosystem restoration.

What's been accomplished?

- Removed 99 percent of invasive shrubs and 55 percent of invasive beach grass from the site; improved habitat quality for species at risk by restoring critical habitat and increasing available open habitat.
- Restored habitat and grew more than 30,000 new plants of the endangered contorted-pod evening-primrose, which increased the population size by 950 percent; sowed seeds for American glehnia and yellow sand-verbena.
- Developed new interpretive signage onsite to teach visitors about how they can help protect this special ecosystem.
- Recruited 241 new volunteers, who contributed more than 1,500 hours.

TOP Aerial view of a coastal sand ecosystem on Sidney Spit, restored through removal of invasive Scotch broom.
BOTTOM Volunteers with shovels in hand after a successful day removing invasive plants. Photo: Pippi Lawn

* *indicates the project has a species-at-risk focus*



Fur to forest

Managing non-native deer in Gulf Islands National Park Reserve

Find out more

What's the issue?

Herds of non-native European fallow deer are gobbling up the forest on Sidney Island, in Gulf Islands National Park Reserve. First introduced in the early 20th century, their numbers, along with the native black-tailed deer, have risen dramatically over the decades. Both types of deer are not picky eaters, and have been stripping Sidney Island of most understory plants, impeding forest regeneration and further endangering species that are already at risk, including the foothill sedge and Edwards' beach moth. Left unchecked – because of a lack of natural predators and limited traditional harvest by Indigenous people – fallow and black-tailed deer will irreparably change the Sidney Island ecosystem. Staff at Gulf Islands National Park Reserve are determined to limit the damage and restore the forest.

What's our approach?

- Work collaboratively with landowners on Sidney Island, other jurisdictions and Indigenous partners to develop a sustainable approach to remove fallow deer from the island.
- Develop and implement additional complementary strategies to restore affected species at risk and species of cultural importance in forested areas of Sidney Island.
- Monitor and document results and adjust restoration practices if necessary.
- Communicate with local communities, stakeholders and the broader Canadian public to garner understanding and support for the restoration project.

What's been accomplished?

- Initiated consultations with stakeholders, Indigenous people and landowners on an approach for removing fallow deer from Sidney Island.
- Formed Indigenous knowledge working group with local Indigenous people, with plans to implement an elder's and youth culture camp in 2018.
- Developed a communication strategy and public information sheet.
- Secured resources to continue planning and implementing the remainder of the project by 2022.

TOP Intense browsing by abundant non-native European fallow deer has created open, lawn-like habitat and is impeding regeneration of native plants on Sidney Island.
BOTTOM The contrast is obvious between a fenced-off area inaccessible to deer (left side of fence) and an area accessible to deer (right side of fence). Photo: Todd Golumbia

Keeping dunes dynamic

*Restoring coastal dunes in Pacific Rim National Park Reserve**

Find out more

What's the issue?

Coastal sand dunes are among Canada's rarest and most sensitive ecosystems; their exact area in British Columbia is unknown, but most are only a few hectares. They exist at the dynamic interface between beaches and forests. Strong ocean winds blow sand off beaches into forests, covering plants, which then grow out over the sand. The dunes and forests are like waves, constantly crashing into one another, creating disturbance-driven habitats favored by rare species like pink sand-verbena, silky beach pea, Edwards' beach and sand-verbena moths. However, those dynamics are being interrupted by an invasion of non-native grasses, which stabilize the dunes, shifting the coastal zone to forest and further threatening species at risk.

What's our approach?

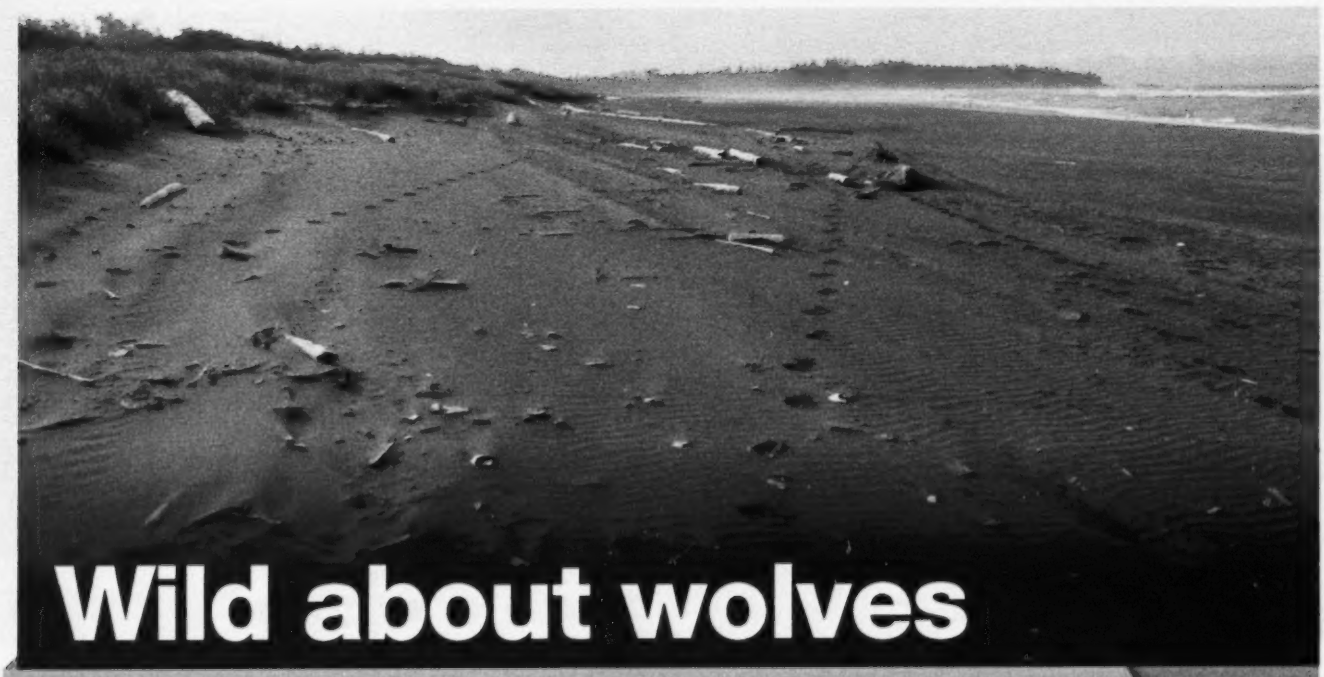
- Engage with Indigenous peoples and other stakeholders on restoration plans.
- Remove invasive plants to increase dynamic dune habitat by 2 hectares.
- Increase habitat available for species at risk; develop protocols for translocation of 100 silky beach pea seeds; propagate and plant 200 pink sand-verbena seedlings at the Cheewhat Dunes.
- Increase our understanding of rare species needs and the effectiveness of restoration efforts through monitoring and research partnerships.
- Enable visitors, schools, youth programs, Indigenous peoples and local communities to learn about and contribute directly to dune restoration.

What's been accomplished?

- Engaged Indigenous partners in planning, restoration and monitoring activities.
- Removed invasive vegetation and restored 2 hectares of Schooner Cove dunes in partnership with Central Westcoast Forest Society and Tla-o-qui-aht First Nation.
- Increased pink sand-verbena by 150 percent and silky beach pea by more than 750 percent by creating new habitat at Schooner Cove (2016 and 2017).
- Surveyed suitable habitat for endangered moths and rare plants; improved our understanding of the status and distribution of species at risk.
- Delivered nine volunteer and interpretive events, including invasive plant pulls where visitors assisted directly in restoration; produced a video highlighting results.

TOP Queen's University professor, Dr. Karen Samis, inspects a patch of the endangered pink sand-verbena. Photo: Mike Collyer
BOTTOM Visitors get their hands dirty removing invasive grasses, helping to restore coastal sand dunes.

* *indicates the project has a species-at-risk focus*



Wild about wolves

Helping humans and wildlife coexist in and around Pacific Rim National Park Reserve

Find out more

What's the issue?

In the 1990s, wolves began to recolonize the west coast of Vancouver Island, where Pacific Rim National Park Reserve is located. This was a positive development for the Nuu-chah-nulth peoples, whose traditional territories include this area and who consider wolves a sacred animal. However, because wolves had been absent since the 1960s, they returned to a significantly changed environment. Now, wolves are sharing spaces such as beaches and trails with humans more frequently – and, problematically, some humans seek out close interactions with the wolves. These factors have created the conditions for conflict between wolves, humans and other wildlife. Recently, some local wolves have lost their natural wariness of people. Others have learned to associate people with food. Domestic dogs, particularly when off leash, have contributed to the conflict. Dogs tend to attract wolves because wolves can perceive them as prey or as an invading canine from another territory.

What's our approach?

- Collaborate with Indigenous partners, neighbouring jurisdictions and stakeholders to develop and implement a common vision for human-wildlife coexistence in this region.
- Develop new understanding of human perspectives and the behaviour of visitors and residents; use this information to build a campaign for changing awareness and behaviour, improving compliance with regulations and reducing conflict with wolves and other wildlife.
- Measure results using before-and-after comparisons of human awareness, behaviour and frequency of conflict with wolves and other wildlife.
- Improve ecological understanding of coastal wolves, their behaviour and habitat use; use the information to promote healthy, wary wolf and human behaviour choices, reduce unnatural food opportunities, and prevent conflicts with people.

What's been accomplished?

- Convened a Nuu-chah-nulth First Nations elders group to provide Indigenous perspectives on wolves and coexistence.
- Established a regional working group for wildlife coexistence to share, coordinate and implement a common vision for the coexistence of people, wolves and other wildlife.
- Piloted field methods to study wolves; collected their DNA (non-invasively, from hair) to identify individual wolves and kinship, and to estimate home ranges and population sizes.
- Developed new wildlife messages for the public – to be used in new signage and communication materials – that explain best practices for keeping wildlife safe and wild; informed Canadians with the help of media coverage.

TOP Wolf tracks on the beach illustrate that wolves frequent these areas that people are also attracted to. Photo: Ian Cruickshank
BOTTOM A wolf rubs up against a tree equipped with a hair trap, which will be sent later for genetic analysis. Photo: Rob Buchanan

Chiixuu Tll iinasdll – Nurturing seafood to grow

Restoring kelp in Gwaii Haanas National Marine Conservation Area Reserve and Haida Heritage Site

Find out more

What's the issue?

Nearly 200 years ago, kuu (sea otters) disappeared from Gwaii Haanas as a result of the maritime fur trade, and coastal ocean ecosystems in the area have experienced a cascade of change ever since. The reason is that sea otter are keystone predators – voracious consumers of marine invertebrates like sea urchin, crab and abalone. Without otters keeping populations in check, spiny sea urchins proliferated, and the cascade began. Urchins in turn began to graze down the rich kelp forests on which species like the endangered northern abalone and many rockfishes (yelloweye, bocaccio, canary, quillback) depend. Kelp forests declined in quantity and quality. In some places the seafloor is now barren, reminiscent of a clear-cut forest, and no longer able to support a diverse marine ecosystem.

What's our approach?

- Work with the Council of the Haida Nation, Fisheries and Oceans Canada, and the Pacific Urchin Harvesters Association to plan and implement a restoration project that mimics sea otter predation.
- Reduce the density of sea urchins by at least 75 percent, covering a total area of 20 hectares of lower intertidal and shallow subtidal seafloor.
- Provide training so Haida Fisheries Program divers can continue to build capacity to conduct kelp forest monitoring; encourage participation of Haida commercial divers to harvest urchin.
- In the years following sea urchin reduction, work with fishing partners to maintain low urchin numbers, allowing kelp forests to recover.
- Provide Haida and local communities with opportunities to access sea urchin for food; discuss with Haida community leaders the distribution of harvested traditional foods: guuding.ngaay (red urchin) and styuu (green urchin).

What's been accomplished?

- Developed and implemented a monitoring protocol to assess the effectiveness of the restoration work; collected one year of pre-restoration baseline data (2017).
- Began collaborative research with Florida State University to investigate changes in kelp forest community and species population dynamics, including changes in abalone and sea urchin diet.
- Initiated plans to mentor Haida Fisheries Program divers in kelp forest community surveys.
- Began drafting a communications plan and visitor experience materials to educate and inspire Canadians about marine restoration.

TOP One stalk of kelp remains surrounded by countless sea urchins where a forest of kelp once existed. Photo: Lynn Lee / © MTE Inc
BOTTOM Improving kelp forests will help endangered marine snails like the northern abalone (centre). Photo: Lynn Lee / © MTE Inc

Llgaay gwii sdiihlda, or restoring balance

Eradicating invasive deer in Gwaii Haanas National Marine Conservation Area Reserve and Haida Heritage Site

Find out more

What's the issue?

Sitka black-tailed deer look harmless enough. But those in Gwaii Haanas National Park Reserve and Haida Heritage Site are invasive and they've left waves of cultural and ecological impacts in their wake. The deer were introduced from Alaska in the late 1800s. Excellent swimmers, they migrated to several islands in Gwaii Haanas archipelago. With no natural predators to keep them in check, the deer have browsed their way through intertidal and forest ecosystems, eating nearly all plants within their reach. The effects have been widespread: the Haida people have been deprived of many important plants for medicine, food and building materials, including t'suu (cedar) and ts'iihlinjaaw (devil's club), while native wildlife – from birds to beetles – have had essential habitats eliminated.

What's our approach?

- Collaborate with the Haida Nation and external experts to develop an eradication plan.
- Gather baseline information to measure the environmental response after deer removal.
- Use eradication techniques to remove all deer from five islands (Ramsay, Bischofs, House, Hotspring and Murchison).
- Garner support from the local community; provide as much harvested meat as possible to the local community.
- Teach Canadians and visitors about the profound effects invasive deer have on cultural and ecological diversity.

What's been accomplished?

- Prepared and launched a comprehensive eradication plan.
- Collected two years of baseline information to evaluate forest recovery.
- Removed deer from all target islands; observed a noticeable increase in cultural plants and other vegetation in 2017.
- Delivered more than 635 kilograms of meat through the Local Foods to School and Meals on Wheels programs.
- Fenced out deer in study areas to show community members and visitors how swiftly important plants can recover.
- Built capacity at Parks Canada and among local biologists in effective eradication techniques and advanced marksmanship; supported prevention, early detection and rapid response if needed in future.

TOP White cedar, along with other culturally important plants, have begun to regrow on islands where deer control has been implemented. Photo: Andy Wright BOTTOM On Kunga Island in Gwaii Hanas National Park Reserve, the contrast is obvious between a fenced-off area inaccessible to the invasive Sitka black-tailed deer (left side of fence) and an area accessible to the deer (right side of fence). Photo: Andy Wright

A Canadian Coast Guard helicopter releases industry-reared wild salmon to the Upper Salmon River in Fundy National Park. Photo: Nigel Pearce Photography

Conservation and Restoration Program

For more on CoRe

Parks Canada continues to invest in our natural priority – conserving and restoring Canada's national parks, national historic sites and national marine conservation areas.

More CoRe projects are starting up this year, including:

- river and lake restoration to benefit native fish in Pacific Rim and Waterton Lakes national parks
- invasive species removal to improve ecosystem function in Georgian Bay Islands, Kouchibouguac, and Point Pelee national parks
- ungulate management to enable vegetation regeneration in Elk Island and Forillon national parks

For updates on these and other conservation and restoration initiatives, please visit your nearest national park, national historic site, national marine conservation area or visit us online.

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